



FRIDAY, JANUARY 26.

## Contributions.

## A Per Diem Charge for Car Service.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A proposition to introduce a new principle into the conduct of business has always a visionary appearance; nevertheless, where, as in the present case, it arises out of long experience of defects of the system in use it should appear less speculative and dreamy.

The detention of cars on foreign roads after all that has been done is still uncured. And the reason is a very simple one: the foreign road has no adequate motive for effective supervision over use of cars not belonging to it. If cars were charged *per diem* the motive would be no longer lacking.

Even under the mileage system some of the better organized roads are charging forgetful station agents for unnecessary mileage made by foreign cars loaded for out-of-the-way points or sent empty in a direction contrary to rules: if the car's time must be paid for, such supervision would be constant and severe, since superintendents and general managers are probably at least twice as sensitive to unnecessary losses paid to other roads as to losses incurred merely to their own.

If such a rule were enforced, a car of a foreign road needed at any point would not be sent nor required a week in advance in order to be "on hand." Wrecks would become serious matters, because every foreign car injured or destroyed would be daily making its charge for service against the road during the whole time of repair or adjustment of loss. Reports of car mileage, now too unreliable to be passed without the acute criticism of an interested party, would then disappear, and adjustments of claims be reduced to the utmost simplicity, namely, so much *per diem* for the full time after the car's delivery to the road until, as shown by positive proofs, it was delivered to proper hands.

The charge if made at 25 cents per day would very nearly equal the value of the use of the money invested in the car, and the usual 6 per cent. per year depreciation by service.

No doubt grave objections could be brought against the adoption of such a principle in payment for car service but then what else but a correct centre of gravity will move cars economically when off their own tracks.

Allen Paper Car Wheel Co.

OFFICE OF THE PRESIDENT, 260 BROADWAY,  
NEW YORK, JAN. 24, 1883.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to an article in your issue of Jan. 12, page 17, signed "New England," permit me to say, that, with over 30,000 paper wheels in service on the 1st of January of the present year, and with reports of only three failures during the year just past, neither of which by derailment caused any injury to equipment or harmed a single passenger, it would seem quite unnecessary for this company to trouble you with any matter upon the merits of our wheel, even to refute an error, rather depending upon the verdict sure to follow the use of these wheels by 150 or more roads that have them in service; but as the writer of the article before mentioned seems to have, unintentionally no doubt, fallen into one or two very gross errors that may be taken for facts by parties not having experience with the paper wheel, I will, with your permission, briefly correct them.

Our price for a 42-in. wheel is \$85. Our price for re-tiring it when the first tire is expended is \$54. As the centre is supposed to be imperishable and can be used indefinitely, the difference between the cost of wheel and re-tiring is \$31 each, making \$82 per pair the value of the old centres, instead of \$20.80 per pair as stated by "New England."

Another very singular error has crept into the article of "New England," viz.: "That it is contended that it is unsafe to use any but soft steel in a tire on a paper wheel, owing to the pressure to be sustained." We think the manufacturers from whom we purchase our tire will not be likely to agree with "New England" in this statement, from the fact that our specifications call for hard, tough tire, and those found to be soft when put in use are replaced by us at no expense to the roads that have purchased the wheels, while we look to the tire manufacturers to make good the loss to us. If "New England" is a Master Car-Builder, as his article indicates, it is singular that he does not know this fact, because we take especial pains to advise all of our patrons of it, viz.: that we guarantee all defects of material or construction, and soft tire is a defect which we are always ready and glad to remedy by replacing the soft tire with a new one.

If "New England" were aware of the above facts, was it quite just for him to ignore them in his article? This your readers can decide for themselves. Leaving other portions of the article to be answered by those having the data at their command, viz.: the roads using the paper wheel, I am yours, very respectfully,

A. G. DARWIN, President.

## The Immediate Needs of Car Service.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have already pointed out some ways in which car service might be improved; methods for simplifying the work of car service departments as they now exist and for the ex-

tension of the service to smaller roads may now be considered.

Taking up the latter subject first, the question may be asked, can a small road afford to have no special oversight over its cars. This is by no means the whole question, but we shall first discuss the fragment as stated. In the first place it must be frankly admitted that car service is one of those operations which affect roads as part of the entire system nearly as much as individual companies. Efficient car-service departments on all roads would benefit every one to an extent comparable to the benefit received by each from its own department.

On general grounds, therefore, a car-service department is to be urged by the larger roads upon the smaller. There is also, however, a strong case for the road as an individual. A car-service department may be carried on at small expense. Even if only moderately efficient it relieves all other officers of care and gives the superintendent a knowledge of facts at all times valuable to him; and for usefulness the department or clerk having these facts must be as close to his elbow as possible. What the loss is even upon a small road by want of proper economy of management due to lack of a proper division of attention is only possible to estimate by experience. Only recently American farmers have discovered, what has many years been known on the best farms of the old world, namely, that the "boss" may easily lose money by being too industrious, and that supervision is often much more valuable than manual labor. It being purely a question of experience for each road, it can only be said that without a car-service account there can be no thorough efficiency of discipline as to details. Smaller roads, it is true, must give a considerable measure of discretion to subordinates utterly destructive of proper management on large roads. It would be a great gain, however, to all roads if the junction report were in use on all. Only about 150 are now using it, whereas there are perhaps two hundred roads which have a car-service department of greater or less efficiency.

Here we propose to ask a very important question.

There are, in the country, a very large number of "lines" in connection with and separate from the railroads; many of these have cars specially appropriated to their use and control by various roads. In addition to these there are "routes," as the "Hoosac Tunnel," which are made up of roads and organizations, several existing on one road, sometimes each having its cars and requiring a detailed classification in reports, the route we have used as an illustration requiring about 24 classifications. This method of appropriation of cars throws an amount of labor upon the car-service department which, so far at least as it is concerned, limits its own present small resources for doing the work it would. Why should not the departments (looking at the matter from their own standpoint) report all cars which fall under the control of any company under one classification and make up balances on this simple basis? A great deal of unnecessary labor is performed by the car record office, by the necessity of reporting mileage of line cars, car trust companies' cars, and individually branded cars, which might be saved if their mileage in one report directly to the road.

There is, also, a larger side to the question. Cars appropriated by a road to the service of a "line" are seriously limited in their usefulness in performing service for the road. A road may have such cars staring it in the face, as it were, and yet be at its wit's ends to supply the call for cars; these appropriated cars lose to the road service, which would be of the greatest value, because they must be sent to distant points where if another system of working were adopted, cars could be ready for the service of any line. This system might be an appropriation of cars for through service, marked as "Through Cars" of that road and ready for use by all lines running over the road.

3. This simple matter of cars set apart for line service, when looked upon closely, will account for scarcity of cars to a great extent.

Clearing-Houses.—There are already two or three clearing-houses in operation, and the subject we have been discussing may be considered with them, as both have features or might have features in common.

The clearing-house as now organized in this country is unquestionably valuable, and it is to be hoped that it may develop into something still more complete, although its field is limited by certain disadvantages which may or may not (we do not claim them as positively necessary to the system) exist.

A car-service account should be under the control of the executive officer of the road, in order that he may at any moment be in possession of all its facts. Moreover, to be correct in its accounts it must keep an unbroken link of reports of the movement of the car, and this can only be obtained by always reporting the departure of a car from the last point of arrival, and when the conductor's report is the basis of account. But to obtain this report nothing but an imperative order from the office of the road will avail; and then its fulfillment may not always follow. Nevertheless, as we have said, the clearing-house has already a place in relation to smaller roads covering a limited territory which may extend into a still larger field.

As to the functions of a clearing-house in settling balances between roads, very much needs to be said before a conclusion can be reached, and these remarks must be considered merely as a contribution to the discussion of the question.

One difficulty with the exercise of such functions by a clearing-house, and possibly in the exercise of certain clearing-house functions by the various lines now existing, is that no person having the necessary lively interest in the road's affairs is present to look after and properly check balances against the road. It is true that discrepancies would be re-

ferred to the roads disagreeing, but there are items of report which would not necessarily appear, and which in present practice often do not appear in the report of the creditor company with that certainty of basis possible were information of the movements of cars on foreign roads as exact as it might be. In other words, on the basis of facts as to car service, there is need for supervision of opposing returns by some one having a lively interest for the financial claims of each road involved, and a full knowledge of many facts.

In closing, however, we would give credit to the clearing-house as now operated for doing the entire country a service where service was sadly needed—namely in the Eastern states:

"Now for a few figures. When that car stood at Bellows Falls, it was, as before stated, within 18 miles of home by the most direct route, and 273 miles by the way it came. It is a very low estimate to say that it would cost two cents a mile to haul that car back, or \$5.46 for the entire distance, to which must be added the car service at one cent per mile, making the actual cost to the companies that hauled that car back not less than \$8.19. It was seventeen days after the car arrived at Bellows Falls before it was delivered to the Northern Railroad at Concord, during which time that company, of course, lost the use of the car. The roads that hauled the car back that 273 miles could well have afforded to pay enough to make it an object for the Central Vermont to haul it from Bellows Falls to Claremont Junction; and the Northern Railroad would, no doubt, gladly have waived the 18 cents car service, rather than have been deprived of the use of the car for 17 days."

## Notes by the Way—Stations and Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There are at present five stations in Cincinnati and two over the river in Kentucky. The Little Miami, by which the Pennsylvania trains enter, has a new station quite central, but in a direction adapted only to roads entering from the East; the Cincinnati, Hamilton & Dayton station is in the new ground of the western limits of the city, with easy access for tracks, but too far from hotels and the business centre to become a union depot, although this road, perhaps, has the largest commutation traffic of any; the Cincinnati, Indianapolis, St. Louis & Chicago station at Plum street is much more nearly in the heart of the city, but is built on land owned by the city government; and the other stations have few if any advantages for a central connection. The entrance to the Plum street station is by the bed of an old canal which is crossed at various levels by all the roads (except those entering the Little Miami station) now entering Cincinnati, and it would be possible to bring into it at various points of entrance all the roads having stations in the western portion of the city. On the line of this canal there is a small way station which is used as a transfer station, and in direct connection with it are tracks running through Front street connecting with the roads from the east, which may be used at night for transfer of freight cars, and even under present ordinances might, perhaps, be used at night for through passenger cars. With so many advantages, the Cincinnati, Indianapolis, St. Louis & Chicago Railroad determined to establish the beginning, at least, of a union station on ground already in large part its own on the corner of Central avenue and Third street, opposite the end of the Plum street station, and obtained an ordinance from the city government to this effect, which allows any road to share its benefits on payment of *pro rata* of cost and expenses, the building, however, being erected by the Cincinnati, Indianapolis, St. Louis & Chicago Company. The main passenger shed, 367 x 132 ft., is nearly finished, and work has already been begun on the main building, which will be to the first story of heavy limestone, to the third story of blue river stone, and above this of pressed brick.

In general the ground plan will be a passenger shed covering six tracks 20 ft. below Third street level, a carriage shed on the level (or not greatly below it) of the lower portion of Central avenue, which makes a dip of some 15 ft. from the level of Third street to Second street. The first floor, which will contain the lower waiting room, baggage room and boiler room, will be nearly on a level with Central avenue at its lower portion; the second floor will be nearly on the level of Third street, and will contain the main waiting room, containing ticket office, ladies room, dining room, etc., the remainder of the building being devoted to offices.

The passenger entering from Third street necessarily descends 20 ft. to reach the lower platform; but this descent is broken by a wide platform on the first floor, connecting with which is the baggage-room, where baggage may be checked if the passenger has not already availed himself of the opportunity in the small checking office off the carriage entrance on Third street, between which and the baggage-room is a baggage elevator—there is a passenger elevator from the main waiting room to the lower platform. A passenger entering from Central avenue descends to the platform by one flight of stairs. He checks at the same baggage room.

The advantages of this plan are several; although the plan itself may be said to have been fixed in some measure by the conditions of the street and track levels. We may specify as follows:

1. Local and commutation traffic, which is already large, will pass only by or through the lower waiting room to Central avenue on its way to the principal business street, namely Fourth street, thus avoiding one flight of steps and preventing the main waiting room from being that untidy apartment so commonly found when it is the passage way for a large local business, especially in so dirty a city as Cincinnati.

2. The main waiting room, a natural entrance for travelers, will be also on a street level, but separated from much of the local traffic. It is intended to construct a very pleas-

ant apartment, and this situation will be no small advantage in its favor. The writer has had a large opportunity to study the practical working of the Pennsylvania's admirable Broad street station in Philadelphia, and does not regard a second-floor waiting room as a disadvantage if on a level with the track platform, although there is much to be said against the necessity of obliging local traffic to ascend a flight of stairs at its last and most hurried moment. Some years ago there was considerable discussion in England as to the healthfulness of out-of-town residence; and it was then pointed out by physicians that considerable danger to the heart existed in the anxiety and haste daily involved in catching trains; this danger which the mortality statistics of modern life show to have a reality, is very much increased by the frequent necessity of mounting flights of stairs, the danger being in proportion to the haste, weight and the age of the person. On the other hand, there are serious disadvantages, and some inconveniences in being obliged to descend flights of steps from the waiting room to the track platform. There are still other disadvantages, which the belated traveler alone can appreciate, in finding the ticket office blocked with anxious buyers. At the Philadelphia Broad street station the New York ticket office is separated from the local and western offices by such a distance as to cause considerable waste of breath in inquiries. One of the first principles in the arrangement of offices and rooms and platforms in a station is to preserve a natural and convenient order, avoiding as far as possible all necessity for inquiries as to ticket office, baggage room and train entrance and trains. This arrangement becomes more important as traffic is increased in kind as well as numbers; and while improvements have been made, there remains still something to be done in this respect in our larger and older stations.

The stations in Cincinnati, especially those of the Little Miami and the Cincinnati, Hamilton & Dayton, are pleasant and convenient and much better appointed than those in New York city, which may be said to have the worst accommodations in this respect of any city in the Union.

The Cincinnati, Hamilton & Dayton shows a liberality which would be most welcome on all suburban lines—namely, in forwarding commuters' packages free of expense. The expense, however, is not so great a consideration as arrangements for reasonable and cheap delivery of packages to the out-of-town resident.

#### CARS.

Several cars which have fallen in my way are worthy of note, especially as showing the tendencies of improvement—for example, some of the Cleveland, Columbus, Cincinnati & Indianapolis cars (noticed some months ago in the *Railroad Gazette*) are admirably fitted up with wash basin and all facilities for that greatest of comforts of travel, namely, a good wash. This improvement is in ordinary through cars and of course involves the loss of several seats. One of the Cincinnati, Hamilton & Dayton cars (there are 12 like it) which I have seen also had a wash basin, but in the ladies' closet, and the Cincinnati Southern has similar cars. This car was finished with cedar, apparently, and while not the most attractive, was one of the most tasteful and plainly decorated cars I have seen. One notes everywhere the increasing use of veneer head-linings and also of Tuscan red as an exterior color for cars. It is difficult to make up any other proper car colors than red or yellow; a variety in the latter color is that used by the Cincinnati, Indianapolis, St. Louis & Chicago, made from white lead and chrome yellow, in proportion of ten to eight. This color has the advantage of looking decently well in the ordinary condition of a car, when covered with cinders and soot; but as chrome yellow is chemically changed by light, the washed car will be found to be darkened in streaks, although the color stands well enough for all common uses. The outsides of cars are made quite too fine for the use and care they get.

The Cincinnati, Indianapolis, St. Louis & Chicago has two tasteful chair cars, but we cannot recommend so much looking glass as they contain so long as the danger of accident and break-up remains: the possibility of being thrown violently into a mirror or *vice versa* cannot be left out of account in considering such decoration.

X. Y. Z.

#### Fire Extinguishing Apparatus Used on the Wabash, St. Louis & Pacific Railway.

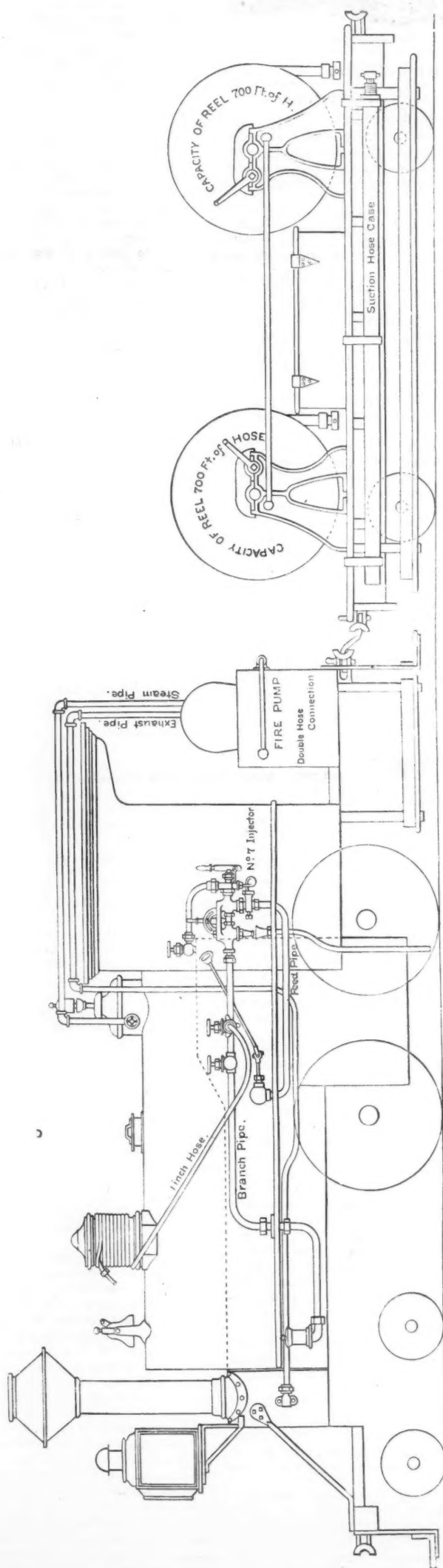
TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Sept. 1, 1882, you had an article from Mr. A. J. Stevens, General Master Mechanic of the Central Pacific, concerning the "attachment to locomotives for extinguishing fires," invented by Mr. Robert Blackall, Superintendent of Machinery of the Delaware & Hudson Canal Co.

As I have just received a circular saying that this device was patented June 13, 1882, I wish to add my testimony to that of Mr. Stevens by saying that a similar arrangement has been in use on locomotives owned by this company for over five years.

On all our road locomotives we make a connection with the branch pipe between injector and check and just in front of the injector. To this connection we attach a small hose and extend it into the cab, where it is convenient for handling by the fireman and is principally used by him for wetting down the coal, washing off the deck or filling a bucket with water, which he can obtain at any desired temperature.

On road locomotives we place a valve in the hose connection for shutting off the escape of water when feeding the boiler, but do not put any in the feed pipe between this connection and the check, as the back pressure of the force



FIRE EXTINGUISHING APPARATUS ATTACHED TO LOCOMOTIVES ON THE WABASH, ST. LOUIS & PACIFIC RAILWAY.

JACOB JOHANN, General Master Mechanist.



required to raise the check-valve is sufficient to force water through the hose to the roof of a two story building, and has been made use of to put out fires in numerous instances.

One instance in particular, occurring about two years ago may be worthy of mention. The engineer of one of our passenger trains on nearing a station on the main line, discovered the passenger depot on fire on the roof, and the station employees endeavoring to put out the fire with buckets of water. Owing to the necessity of carrying the water up a ladder the fire was fast getting beyond their control, when the engineer disconnected his engine from the train, pulled up along side of the depot and soon had the fire under control and extinguished with the "squirt," as we call it.

An arrangement almost identical with the one illustrated in your issue of Aug. 11, has been used on our yard and fire engine at the Springfield (Ill.), shops for over four years.

On this engine in addition to the regular fire pump with double hose connection we have a "squirt" connection in front of injector with several lengths of 1-in. hose which are always kept connected and wrapped around the sand box when not in use.

In this case we have a globe valve in the branch pipe to shut off connection with the check, and one in the "squirt" connection to shut off from the hose.

I enclose you with this an outline sketch of this engine, which will more clearly show the application of the device.

We added this arrangement to our fire engine, in order to check fires in their incipency as much as possible, as it is always ready for almost instantaneous use.

A few weeks ago we had to depend on this "squirt" entirely to extinguish a fire in our coal chutes, situated two miles from Springfield, owing to it being impossible to make a water connection for the fire pump suction hose. The tank of the engine was kept replenished with water by using buckets.

In another instance a caboose caught fire in the yard, and before it was discovered the whole interior was in a blaze, with flames issuing from the windows. The "squirt" was brought into requisition as soon as possible, and in a few moments the caboose was filled with steam and hot water, and the fire effectually smothered.

We do not claim any originality in this arrangement, as it has been in use for many years on other roads.

JACOB JOHANN.

General Master Mechanic Wabash, St. Louis & Pacific Railway.

#### Experiments on Steel and Iron Bridge Girders.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As much as 16 years ago the Dutch government used steel for parts of its great bridges. But not earlier than 1878 and 1879, on occasion of the construction of the Nymwegen Bridge, the Dutch railway engineers ordered a complete series of experiments to be made, in order to test the real strength of riveted steel girders as compared with those of iron.

Continental government specifications generally prescribe that a certain percentage of finished girders and cross bearers shall be tested, and, therefore, a good opportunity was offered to thoroughly test—without great extra cost—with the aid of scientifically constructed apparatus, some of the foundations of the rules of design, which were for the most part only theoretical, in a more scientific manner than had hitherto been done. These experiments were carried out in presence of six Dutch engineers, an experimenter in charge of the Harknut Works, and a number of representatives of Friedrich Krupp and of the "Union" of Dortmund.

In the year 1878 the *Railroad Gazette* published an abstract of a Dutch government specification which is almost identical with those exacted in Germany, to which the Rhenish bridge shops are accustomed. The writer himself, having for the last two years obtained bridge work from two of these shops, can testify as to their superior quality of workmanship. All bolt and rivet holes are drilled, and the other operations are executed with corresponding care. These remarks may not be considered as superfluous, because 15 out of 42 specimens being chosen from those ordered for the Nymwegen bridge, the experiments furnish results which indicate what in practice may be expected from well executed and simply constructed riveted girders acted upon by steadily increased pressures.

Also a number of chemical analyses were made. They are given in Table No. 1. But inasmuch as the Dutch engineers did not carry out their intention of furnishing 90 more themselves, they are not complete. However, Table No. 1 will give an idea as to the chemical qualities of the material used.

TABLE NO. 1.  
Chemical Composition in Parts of One Per Cent.

	Hard Steel.	Medium Steel.				Ingot Iron.
Steel taken from girder No.	16	30	27	28	6	
Tensile strength.....	120,000	94,300	84,400	91,500	68,700	
Carbon.....	0.370	0.294	0.260	0.265	0.120	
Phosphorus.....	0.112	0.405	0.154	0.105	0.103	
Copper.....	0.059	0.119	0.126	0.160	0.095	
Sulphur.....	0.055	0.058	0.082	0.293	0.030	
Manganese.....	0.285	0.072	0.253	0.237	0.271	
Silicon.....	0.536	0.070	0.014	0.018	0.027	

Of the 32 girders 23 were of steel, which was specified to stand 85,332 lbs. per square inch (80 kilos. per square millimetre), with an extension of 17 per cent. after rupture and a contraction of area of 25 per cent. Plates of 0.28 in.,

0.36 in., 0.4 in. thickness should endure without cracks bending under pressure in previously prepared blocks to the corresponding angle of 140, 120, or 110 degrees. The extension was measured on specimens which were 8 in. long between points.

Three girders were made of hard steel, specified to the ultimate strength of 113,776 lbs. (80 kilos per square millimetre), with the previous conditions for bending.

Three girders were built of homogeneous (ingot) iron furnished by Fr. Krupp. It was ordered to stand from 71,110 to 64,000 lbs. per square inch, to stretch 25 per cent., and to bend as already specified. This class of material is probably not unknown to many Americans, since Thomas Prosser, of New York, distributes pamphlets of the records of experiments made by David Kirkaldy in comparison with the best brands of Yorkshire iron, which, according to those experiments, it considerably exceeds in quality.

Finally three girders were made of iron, puddled and rolled at the Harknut Works, specified to stand 57,500 lbs. per square inch (36 kilos per square millimetre), to stretch 8 per cent., to bend to 50 degrees, and to show 13 per cent. contraction of area.

It will be seen that as a rule the material of the girders tested exceeded the quality specified.

In a strongly built direct acting lever testing machine, capable of exerting tensions of 22 tons, three tensile tests of the metal of each of the above girders were made. The test girders were cut from the broken girders, one from the end, the second from the centre of the web plate, and the third from the centre of the covering flange plate.

The construction of the presented girder testing machine exhibits the usual application of force by hydraulic pressure and measurement by a combination of levers. The weight of the scale consists of water in a cylinder, the level of which is indicated by a glass tube. One millimetre of rise of level corresponds with the addition of one kilogram of water. The hydraulic press is handled in such a manner that the cylinder is but very little above a stone support provided with the knob of an electric bell which rings in case the cylinder should touch the bearing. In this manner the knife-edges are kept in their correct position. The machine is constructed to exert pressures up to 250 tons.

The pressure of the press acts upon the centre of the tested girder. Hence the shearing force of the girder is the same in any of its sections. Therefore the rivets are more exerted in the centre of the girder than would be the case if double the pressure of the press were uniformly distributed over the girder, though in both cases the maxima moments would be equal.

In order to transfer those concentrated pressures four stiffening angles are bolted to the stringers at the ends as well as in the centre.

The results of the experiments are represented on 32 lithographed tables accompanied by 10 diagrams showing the curves, which are obtained by laying down the deflections as ordinates corresponding to the maxima strains per square unit by which they were produced.

In the calculation of strains the weights of the various parts of the testing machine, of the apparatus for measurement of deflections and that of the girder itself were duly considered.

The moments of resistance of the different girders were also carefully calculated, the central sections, with deduction of the rivet holes, serving as basis of comparison.

If it is required to calculate the moduli, it is essential to use a moment of inertia between the two, one calculated with and the other without the rivet holes. The writer has calculated from the figures of the tables the moduli in pounds per square inch. But as in these tables the moments of inertia without the rivet holes are used, the moduli became much too great.

The deflections were read very frequently. In some instances 100 and more readings were taken, so as to observe the deflections for each additional kilogram of strain per square millimetre (1,422 lbs. per square inch).

In cases when a sudden increase of deflection took place, or when a loud sound or report was noticed, the water was made to run out, the girder was carefully examined and the experiment commenced again, when naturally a small permanent set was observed. Thus is one instance the experiment was repeated six times. The  $M_1$ ,  $M_2$ ,  $M_3$  of Table 2 refer therefore to the moduli as obtained during the first, second, and sixth repetition of the experiment.

The tables give the deflections in hundredths of one millimetre ( $\frac{1}{100}$ th of an inch).

The tested girders were of the following construction:

Type 4-5.—Steel stringers of the 426 ft. span of the Nymwegen bridge. Web, 27 in. by 0.28 in.; 4 angles  $2\frac{1}{2}$  by  $2\frac{1}{2}$  by 0.28 in. (the legs with parallel sides, equal thickness); length between knife edges, 16 ft. 5 in. One tensile or bottom flange plate,  $5\frac{1}{2}$  in. by  $\frac{5}{8}$  in.; moment of inertia in centre, 1,371 (1,734 with area of holes considered); moment of resistance, 91.4 cubic inches (or 115.6).

Type 5-6.—Steel stringers of the 426 ft. span. Web,  $28\frac{1}{2}$  in. by 0.28 in., four angles as before; length between knife edges 17 ft.  $8\frac{1}{2}$  in. by 4 in.; top and bottom flange-plates  $5\frac{1}{2}$  in. by 0.28 in., the latter only resting over a part of the girder; moment of inertia, 1,624 (1,995); moment of resistance, 118 (145).

Type 6-7.—Steel stringers, same as 5-6, length, however, 19 ft. The rivets of these three types were  $\frac{1}{2}$  in. in diameter, spaced  $3\frac{1}{2}$  in. apart.

Type Floor-beams.—Web,  $39\frac{1}{2}$  in. by 0.36 in.; four angles  $3\frac{1}{2}$  by  $3\frac{1}{2}$  by 0.4 in.; length, 28 ft. 3 in. between knife-edges; rivets,  $\frac{1}{2}$  in. in diameter spaced  $3\frac{1}{2}$  in.; two top and two bottom plates,  $8\frac{1}{2}$  in. by 0.4 in., of which two extend all over the beam and two are only 16 ft. 5 in. long;

moment of inertia, 8,080 (10,943); moment of resistance, 443 (534) cubic inches.

Type of Iron Girders.—Stringers like 6-7, but built much stronger. Each consisted of a web plate 26.9 in. by 0.4 in.; four angles  $2\frac{1}{2}$  by  $2\frac{1}{2}$  by 0.4 in., and three top and three bottom flange-plates, 6.7 in. by 0.24 in. Two of these plates reached over the whole girder, the others were shorter according to theory.

The moment of inertia was 3,551 (4,390), and the moment of resistance 245 (304) cubic inches.

The webs of the girders were stiffened by angles filling only the free space between the flange angles. The temporary stiffeners, however, reached up and were fitted between the horizontal legs of the flange angles. They rested on flat bearing plates.

The web plates of the floor-beams were spliced in the centre with pairs of plates 0.28 in. thick each.

Of the 32 girders tested, the following different classes must be considered separately:

1. Experiments (Nos. 5, 16, 24.) with stringers of type 6-7 were built of hard steel furnished by the Kianish Steel Works, and of steel rivets of the usual Dutch government quality taken from stock. "The holes were drilled at once through angles and plates; they were not rimmed, nor drift-pinned, during riveting the parts were held together by temporary bolts, and in every regard the girders were built up with the greatest possible care."

2. Experiments with stringers of medium steel (85,332 lbs. per square inch), namely:

Nos. 12, 13, 14, 15 of type 4-5; all six from Nymwegen "1-2" "5-6" Bridge.

"3, 7, 8, 9, 10, 11, 19, 22, 27 of type 6-7, six of which were from Nymwegen Bridge.

The steel for these 15 stringers was furnished by the Union works.

"All holes were bored, rimmed smooth, the material pickled and oiled before riveting, hence, the whole manufacture of the usual bridge-builders work."

3. Experiments also with medium steel of the Union. The girders Nos. 30, 31 and 32, however, were floor-beams. Manufacture the usual one as under (2).

4. Experiments 20, 21, 26, type 6-7, of medium steel from the Dortmund Union, but previously annealed at the steel works. Manufacture, the same as under (1).

5. The stringers, 28 and 29, also of medium steel from the Union, were not riveted but bolted together.

"All holes were drilled through plates and angles at once, then rimmed slightly conical, thereupon the bolts likewise conical, were placed and firmly, but without force, screwed home. Drift-pinning was entirely avoided, only temporary bolts being used; in all respects the girders were well built up for the purpose of the experiment."

6. Experiments 6, 17 and 25 were made with stringers, type 6-7, built of homogeneous (ingot) iron. The steel rivets were of the usual Dutch government stock. Manufacture, the same as under (1) and (4).

7. Finally, the experiments 4, 18 and 23 were made with the three puddled iron stringers with flange plates. The rivets were of the Dutch quality from stock, and the manufacture extra good, as under (1), (4) and (6).

The elastic qualities of the tested girders can be studied from Table No. 2.

To show clearly these qualities, there is perhaps no better method than to calculate the average moduli, as obtained from the deflections found, first, by a starting strain, and then by successive greater test strains. A starting strain is adopted in order to eliminate occasional disturbances caused by slight local depressions, etc.

For the purpose of this abstract, the rich material of the tables was condensed. One column of the "original Moduli Mo." gives the average values between strains only caused by the dead load, etc., of the girder and a maximum strain of 14,222 lbs. per square inch (10 kilos per square millimetre). These values (Mo), therefore, refer to the behavior of girders in practice. They show with what degree of justification in certain kinds of scientific investigations the modulus may be supposed to be a constant quantity.

The other moduli are all calculated from the same starting strain of 7,111 lbs. (5 kilos per millimetre), and also from twice, three times, four times, etc. This same strain (between 5 and 10, 5 and 15, 5 and 20. . . to 5 and 65 kilos per millimetre).

In 14 vertical columns of the table the moduli were calculated from the last repetition of experiment with each girder. Hence the moduli  $M_2$ ,  $M_3$ , . . .  $M_n$  are somewhat greater than would have been the case if only the first experiment had been made and continued to the destruction of the girder.

The next column contains the average original moduli of each class as already explained, these moduli are all too great. Since, however, not their absolute but their relative values are most interesting, a new calculation with the moments of inertia with consideration of the area of the rivet-holes was not made. But for the average values (Mo) of each class this was done. For this purpose 0.8 of the differences of the moments of inertia are added to the smaller ones, and therefore the new moduli calculated.

The next column contains the elastic limits. Wherever the moduli of the previous columns commence to decrease sensibly for a specimen, the limit of elasticity must be looked for. In determining the same the moduli of Table 2, the deflections and the curves of the diagrams were consulted together. Those moduli of the table which are characteristic for the neighborhood of the limit are underscored.

The table admits of some interesting conclusions.

The modulus, hence the deflections of a girder depend not only on the material, but also on design and manufacture,

TABLE NO. 2.  
Average Moduli in Millions of Pounds per square inch.

Number of experiment.	HARD STEEL.			MEDIUM STEEL, USUAL GOOD MANUFACTURE.																		MEDIUM STEEL.			MEDIUM STEEL.			MED. STEEL.		HOMOGENEOUS.			PUDDLED IRON.		
	Stringers.			Stringers.						Stringers.						Stringers.						Floor beams.			Annealed.			Taper bolts.		Ingot iron.			Stringers with Flange plates.		
	Types: 6-7.			4-5				5-6		6-7						6-7			6-7			6-7		6-7			6-7								
	5	16	24	12	13	14	15	1	2	3	7	8	9	10	11	19	22	27	30	31	32	20	21	26	28	29	6	17	25	4	18	23			
Original moduli up to 8 = 14,222 lbs. Mo =	34.7	33.0	34.7	41.0	38.6	39.8	43	36.5	38.1	38.5	33.5	32.8	36.8	36.1	39.2	33.0	40.2	35.4	21.7	20.4	20.7	22.4	33.0	35.7	40.0	36.5	34.1	29.7	31.2	33.4	34.1	34.7			
The average moduli are taken between the following limits of maximum strains:	Pounds per sq. in.	M 1	M 3	M 1	M 1	M 1	M 1	M 1	M 1	M 1	M 1	M 1	M 1	M 1	M 3	M 4	M 3	M 4	M 3	M 3	M 1	M 2	M 1	M 3	M 3	M 1	M 4	M 3	M 1	M 3	M 6				
	7,111 and 14,222	31.7	31.7	31.7	38.8	32.4	31.1	40.8	30.5	35.4	38.0	32.7	30.8	33.5	40.0	35.8	31.7	33.5	34.5	26.0	24.5	28.1	20.1	31.7	30.0	53.8	32.1	28.5	31.7	29.2	29.5	35.2	33.1		
	7,111 and 21,333	30.6	31.3	30.6	39.0	34.7	33.1	41.0	28.5	32.7	31.0	31.2	30.5	32.7	31.0	33.5	33.1	32.5	34.1	25.7	25.0	26.8	19.5	30.8	28.1	32.1	32.2	27.4	30.7	29.9	30.4	34.2	32.5		
	7,111 and 28,444	30.6	31.6	30.6	35.0	33.6	33.1	39.1	32.3	39.1	30.1	31.1	31.1	30.8	33.2	31.1	34.2	39.1	32.5	34.8	25.7	24.8	26.4	17.1	31.1	26.2	27.4	32.8	26.5	31.7	30.2	31.0	34.7	32.7	
	7,111 and 35,555	30.3	31.4	30.3	34.3	32.8	33.6	36.0	33.1	30.7	29.7	28.0	30.2	33.1	30.8	28.1	32.8	32.5	34.2	25.0	25.0	26.4	11.4 to 10.2	26.5	25.2	27.4	32.0	25.2	31.0	30.2	28.5	31.2	32.8		
	7,111 and 42,666	30.6	31.6	30.4	33.8	32.8	34	37.0	32.8	30.4	29.8	25.7	29.8	33.7	29.1	?	33.1	34.0	24.5	24.4	26.1	24.1	26.5	25.2	27.4	30.8	30.7	20.0	30.4	24.2	21.7	24.8	33.2		
	7,111 and 49,777	30.9	31.4	30.9	33.6	33.4	30.8	36.5	28.3	30.8	28.3	24.0	25.7	32.5	26.0	(5-32)	30.7	30.0	32.1	23.0	23.5	24.2	24.1	26.5	25.2	27.4	29.5	28.5	11.2	22.0	13.8	11.7	21.4	15.5	
	7,111 and 56,888	30.3	31.1	30.3	32.8	33.5	27.0	36.4	18.6	20.7	25.2	20.0	(5-32)	28.2	(5-38)	29.8	27.1	31.2	(5-33)	23.2	24.5	24.5	24.1	26.5	25.2	27.4	29.5	28.5	12.0	8.0	(5-37)	7.0	(5-39)		
	7,111 and 63,999	30.3	29.1	30.3	23.3	24.2	35.8	15.7	27.4	24.7	(5-48)	24.7	(5-48)	24.7	(5-48)	29.8	27.1	31.2	(5-43)	23.2	24.5	24.5	24.1	26.5	25.2	27.4	29.5	28.5	12.0	8.0	(5-37)	7.0	(5-39)		
	7,111 and 71,110	30.3	30.7	30.3	21.4	21.4	35.4	15.7	27.4	24.7	(5-48)	24.7	(5-48)	24.7	(5-48)	29.8	27.1	31.2	(5-43)	23.2	24.5	24.5	24.1	26.5	25.2	27.4	29.5	28.5	12.0	8.0	(5-37)	7.0	(5-39)		
	7,111 and 78,221	25.3	30.0	29.0	25.0	25.0	35.0	15.7	27.4	24.7	(5-48)	24.7	(5-48)	24.7	(5-48)	29.8	27.1	31.2	(5-43)	23.2	24.5	24.5	24.1	26.5	25.2	27.4	29.5	28.5	12.0	8.0	(5-37)	7.0	(5-39)		
7,111 and 85,332	20.6	29.0	25.0	25.0	25.0	35.0	15.7	27.4	24.7	(5-48)	24.7	(5-48)	24.7	(5-48)	29.8	27.1	31.2	(5-43)	23.2	24.5	24.5	24.1	26.5	25.2	27.4	29.5	28.5	12.0	8.0	(5-37)	7.0	(5-39)			
7,111 and 92,413	25.7	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6		
7,111 and 99,554	23.4	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6		
Average moduli at 0.0001 in. deflection	34.1			40.6				37.3					36.2					22.9			30.3		38.2		31.7							34.1			
And corrected Mo.	28.6			33.3				31.3					30.4					19.7			25.4		32.0		26.6							28.6			
Elastic limits	78200	89500	89500	50900	51400	43500	64,200	48600	48600	44000	31400	42700	52600	42700	34100	50000	50000	52800	38200	42700	42700	19000	31300	35600	50600	42700	33000	33000	33,000	28400	28400	28400			
Av. limits	85,700							47,900											40,900			28,600		46,300		33,300							28,400		
Av. ultimate strength of material	120,000							80,100											92,400			72,000		91,000		65,400							53,500		

NOTE.—The figures (5-48), (5-42), etc., indicate that the girders broke before the next higher strains of 50 (71,110), 45 (63,999) kilogrammes per square millimetre were reached. The moduli are taken between the figures 5-48, 5-42, etc., kilogrammes.

TABLE NO. 3.  
Strength in Pounds per Square Inch of Net Area.

TYPE OF GIRDERS.	HARD STEEL (80 KO).			MEDIUM STEEL (60 KO).																		MEDIUM STEEL.			ANNEALED MEDIUM STEEL.			MEDIUM STEEL.			HOMOGENEOUS INGOT IRON.			PUDDLED IRON.										
	6-7			4-5			5-6			6-7									Floorbeams Flange plates.			6-7			6-7			6-7			Stringers, 6-7 Flange-plates.													
	Extra, no drift pins, riveted.			Ordinary good manufacture, drilled and rimmed holes.																											Usual, drilled and rimmed holes, riveted.			Extra, no drift-pins, riveted.			Extra, no drifts, bolted.			Extra, no drift-pins, riveted.			Extra, no drift-pins, riveted.	
Manufacture.	5	16	24	12	13	14	15	1	2	3	7	8	9	10	11	19	22	27	30	31	32	20	21	26	28	29	6	17	25	4	18	23												
Experiment, No. ....	5	16	24	12	13	14	15	1	2	3	7	8	9	10	11	19	22	27	30	31	32	20	21	26	28	29	6	17	25	4	18	23												
Web-plates.	Ultimate tension.	115700	120000	118800	88900	88200	93700	94600	96600	85900	65200	106000	86800	101700	103800	87400	91700	76100	63900	95300	99600	90300	88200	71800	71100	89600	86700	69400	59700	63300	56200	50200	50900											
	Extension percent.	14	14	14	16	11.5	16	13	15.5	16	14	14	16	15.5	12	16	15	17	17	14	16	18	16	18	19	15	14	22	20	24	22	22	24											
	Extension percent. of not contracted part.	9.5	10	10	11	11	11	9	11	12	10	11	12	12	8	13	10.5	11	12	10	11	13	13	14	13	11	10	13	14	18	.....	.....	.....											
	Contraction p.c. Bent to an- gles of degrees.	30.5	32	35	33.5	27	35	35	34	39	33	31	39	37	983	33	35	45	35	32	38	39	33	35	35	34	35	43	46	46	27	31	30											
	102	73	106	180	162	132	93	148	116	145	137	133	145	146	180	180	180	162	67	60	120	136	180	176	100	147	180	180	180	140	126	133												
Flange-plates.	Ultimate tension.	119500	120000	119400	91000	89900	.....	89600	89600	88106	89600	79600	92400	96700	92400	78200	86800	86800	99600	92400	78200	106600	65400	71100	78200	95300	96700	68300	68300	68300	54000	56900	55600											
	Extension percent.	14	14	14	19	18	.....	15	18	17	16	13	15	19	20	20	13	16	14	17	16	14	5	15	16	13	13	21	24	24	15	14	12											
	Extension percent. of not contracted part.	5	10	10	14	14	.. ..	11	14	15	12	12	11	10	13	12	11	12	11	13	11	10	.....	8	12	10	10	14	19	18	14	10	.....											
	Contraction p.c. Bent to an- gles of degrees.	31	24	36	35	33	.....	31	31	33	36	48	74	39	39	41	36	25	.....	42	46	43	.....	37	27	20	26	47	49	50	23	24	11											
	180	109	136	.....	.....	.....	.....	150	150	170	180	74	85	90	149	94	180	178	86	105	68	128	29	28	180	177	180	180	180	176	180	115												
Strains of 1st rupture of tension flanges.....	78200	.....	.....	.....	52600	49800	83900	53400	42700	25600	32700	.....	.....	.....	34100	54900	51000	.....	44500	.....	.....	24200	.....	28200	.....	.....	.....	.....	.....	.....	.....	49800												
Strains of to- tal failures.	96700	96700	89000	69700	54000	60800	83900	65400	68200	56900	28300	45500	54000	47000	40800	61000	64000	62000	48300	58900	50900	36900	32700	41000	71000	68000	57000	50000	50000	54000	55500	59900												
Average breaking strains .....	86390			50900																		53890			28400			69500			50300			51900										
Ultimate ten- sion of metal falling first.....	120000	120000	120000	91000	83800	98000	89600	85600	88200	88600	79600	92400	96700	92400	78200	90000	86700	99500	92400	78200	109600	65400	71000	78200	91500	90000	68700	62600	64800	55400	56900	54000												
Percentage realized.....	65.2	80	70	76.5	56.1	59.8	93.6	61.9	48.4	28.6	41.0	49.2	55.8	50.9	43.6	60.6	62.3	62.0	48.1	74.4	53.4	57	46	96	77.6	75.5	74.2	80.5	77100	90	97.5	100												
Average per- centage of strength re- alized.....	71.7			56.1																		58.6			39.7			76.5			77.7			96.8										

Thus the floor beams, though of the same steel as the fifteen preceding stringers, exhibit considerably lower moduli, also the elastic limits are lower than those of the fifteen stringers. This must be due to the multiplicity of parts and rivets.

On the other hand the girders built of puddled iron, though consisting of more parts than the floor beams, probably by reason of their more careful manufacture, and also because of the greater uniformity of the material of their constituent parts, not only exhibit higher moduli, but also higher relative limits. Their diagrams also show much greater regularity and uniformity of the curves of deflections.

Annealing did not prove of any benefit with the three steel stringers, Nos. 20, 21 and 26. It seems to have reduced the moduli as well as the elastic limit, which latter in the average is only 28,600 lbs., as against 47,900 of the 15 stringers of the same kind of steel. The curves of deflections of the annealed steel girders, notwithstanding their extra good manufacture, differ considerably one from the others. It seems that the steel was not evenly annealed.

Striking by their regularity of curves of deflection of their moduli and elastic limits are the two bolted girders, the

three stringers of homogeneous metal, and those made of puddled iron.

The conical bolts in conically rimmed holes give results which are equally as good as those by riveting; nor compared with the 15 riveted stringers of the same kind of steel are the bolted girders much superior.

Also, the three girders of hard steel, probably because of their extra good workmanship with exclusion of drift-pins, gave good curves of deflections, regularly decreasing moduli, and regular and high elastic limits, the latter much enhanced by the hardness of the metal. The elastic limits of the finished girders are of special interest. They are the turning points in the curves of deflections, near which the curvatures are sharper than anywhere else. For the bolted girders, the homogeneous metal stringers, and the puddled iron girders with flange plates, the limits are almost exactly one-half of the ultimate resistance of their material, corresponding with the usual limit of elasticity of unmanufactured iron. The behavior as regards deflections beyond that limit is known to be entirely dependent on the specific nature of the material used, and the same observation must be made for the finished girders. Now the diagrams of de-

flections, as well as the moduli of the bolted steel stringers, of those of homogeneous metal, and of the iron girders, agree strikingly with the forms of curves as known to exist for the best classes of iron and steel, tested in their original condition, such as for instance are shown in Stuppé's work.

The 32 experiments before us do not present the remotest endorsement for a certain rule, recently alleged in an English Engineering periodical, that girders under pressure exhibit striking deflections at the  $\frac{3}{4}$  point of their ultimate strength, or that they fail suddenly, or by compression. On the contrary, the behaviour of these 32 experiments, which by their thoroughness and scientific nature put far into the shade the few old ones, prove once more that beyond that limit the possibility of any scientific rule ceases. The elastic limit itself is the turning point beyond which remains the playground for empirics, where the greatest variety may be found, according to more or less complex construction, according to good or bad workmanship, and according to the quality of the material, of which one extreme is perhaps represented by the behavior of the poorest description of rolled girders, such as not infrequently are used in English architectural iron work, and the other extreme

</



is presented by experiments with the finest Swedish charcoal iron.

For the study of the ultimate strength of the materials of the 32 girders, and of their failure, Table No. 3 was condensed from the reports of the experiments.

Of the hard steel girders two failed by rupture of the tensile flanges in or near the centres of the girders. No. 16 failed by crippling of the compressional flange, a fold also being formed in the web plate, both failures being found between the additional stiffeners in the centre and the nearest permanent stiffener. The girder did not fail suddenly, but gradually, and it was impossible to obtain any higher pressure by pumping.

The first rupture of No. 5 happened in both its tensile flanges, which had their horizontal legs torn.

The high percentage of 71.7 realized by hard steel stringers must be attributed to their extra good manufacture, with exclusion of drift-pins.

As regards the 15 stringers of medium steel their material as uniform enough, and the works, knowing it to be intended for the Dutch bridge, certainly tried to give satisfaction, and 12 out of these 15 girders were originally intended for the Nymwegen Bridge. All 15 girders failed in tension in most instances at their centres, or at most, only one, two or three rivet distances from the centre, and the rents, as in all analogous cases, run through the rivet-holes.

Three of these stringers were so placed in the testing machine that the compressional flanges only consisted of two angles. Girder No. 14, on the contrary, was placed in a reversed position, its tensile flange consisting of two angles.

Ten of the girders were already broken by strains lower than those under which they were entirely ruptured. Of experiments 14, 2, 19 and 22, these ruptures happened through the flange angles alone; in the other instances through the flange plates, with or without broken angles. Probably after these first ruptures, owing to the hardness of the material, the neutral axis was moved near to the compression flanges, thus enabling the stringers for a short time to carry additional loads. For practical purposes, however, the girders, after their first ruptures in the tensional flanges, would have to be considered as unfit for further use.

For this reason the writer calculated the percentage of ultimate resistance from these first tensile breakages.

The ultimate strength of this lot is very irregular and unexpectedly low, being less than the strength of the iron stringers, though these are of much more complex design. Some of the 15 stringers behaved no better than would have been expected from good cast iron. If the ultimate strength were calculated from the total rupture of each girder, 66.3 per cent. of the calculated strength would be found as the average net result realized, instead of the 56.1 per cent. of the table. The ultimate strength itself would be 60,200 instead of 50,900 lbs. The three floor beams of medium steel and of good usual manufacture also broke through their tensile flanges in the centres of the girders. Their results are somewhat more regular and better. The three beams and 15 stringers together show an average strength of 51,900 lbs., or 56½ per cent. of their calculated strength, the rivet holes being deducted.

The annealed steel girders also broke by tension, the result being still more unsatisfactory, not 40 per cent. being realized. In report No. 20 it is mentioned that the rupture of the tensile test piece from the flange exhibited burned crystalline structure.

The influence of careful manufacture is plainly set forth by the two experiments with stringers built together with tapering bolts and without drift pins. Both these girders, though of the same kind of steel as the 21 preceding ones, failed not by tension, as the others, but by crippling of their compressional flanges at places near to the first permanent web stiffeners in the centre. They did not fail suddenly, but gradually like No. 16 of hard steel. The three homogeneous metal girders failed through folds of their webs and bulging or crippling of the compressional flanges. The girders 6 and 25 exhibited two regular web folds, one at each side of the temporary central stiffener. The three girders again failed very gradually, like Nos. 16, 28 and 29. The failure of No. 25 was accompanied by continued crackling of the bending parts, its tensile flange also becoming much rounded.

This isotropic metal, undoubtedly of excellent qualities for boilers, seems too soft and yielding for bridge-girders. Not quite 78 per cent. of the theoretical strength was realized, which is less, absolutely as well as relatively, than yielded by the much cheaper puddled iron.

Of the last group of three puddled-iron girders with three pairs of flange plates, No. 4 can hardly be considered as having totally failed. It was of course permanently bent, and the compressional flange had assumed a wavy appearance between the rivets as fixed points. Nor were the two other girders broken down anything like the girders of medium steel and usual manufacture. No. 18 failed at the same time, not only by two regular web folds symmetrically located near the central stiffeners, combined with a slight bulging of the flange, but also by numerous small tensional ruptures in the other flange-plate, these ruptures starting in a regular manner from the most strained parts of the rivet holes. No. 23 principally failed by tension, and at the same time the web formed folds, and the compressional flange began to become wavy.

These three iron girders of which the regular and almost identical curves of deflections were already mentioned, realized 95.8 per cent. of their calculated strength, and excel all others in the regularity of their behavior. Such excellent iron, however, which in plates of one metre width and for 6¼ in. flats shows an absolute average strength of 56,000

lbs. (exactly 25 tons) on long specimens is not obtained easily every where. It was this good quality, still further evidenced by the uniform good fibrous fracture of the six tensile test specimens, and combined with the superior manufacture, which caused the excellent result. It may not be superfluous to add, that had tensile tests also been made on pieces of the angles, the original ultimate strength of the table would have become a little higher, inasmuch as angles, owing to the great pressure which they receive in the rolls, as a rule show higher ultimate strength than plates. The results of the 32 Harkort experiments with older ones, it may be remarked that it has been stated several times by so high an authority on steel as Dr. W. Siemens, that the full theoretical strength of joints of riveted steel plates must not be expected, and that engineers have yet to learn how to use steel properly.

As regards the few old experiments on riveted iron girders, the writer, not satisfied with the interpretation by others, a number of years ago, thoroughly studied the originals of those experiments. He found that they were incomplete, that the manner in which the experiments were conducted was not given in full, that the nature of the manufacture of the specimens, their tensile and other qualities were not recorded, etc. As a rule, a number of riveted tubes and the model of the Britannia Bridge (repeatedly broken, re-enforced, patched and re-tested) gave ultimate strength of about 35,000 lbs. per square inch of net area, or but little more. The girder tested by Brunel was the most unsatisfactory of all; it broke—though of exceptionally good iron—at about 12 tons per square inch of net area, and exhibited other irregularities which do not entitle its experimental results to the rank of scientific or trustworthy material.

On the completion of the Harkort experiments, the Dutch engineers, who had previously obtained two steel draw bridges of similar design for the docks of Rotterdam, did not order the third one which was intended to be made of steel also. They then specified wrought iron like that of the three girders above. And the writer has learned that the Dutch railway engineers have discontinued the use of steel for bridges ever since. Moreover, at two of the greatest German iron and steel works, the writer has heard only unfavorable opinions as regards the use of steel for bridges.

In connection with the above experiments, these emphatic opinions, coming from most competent quarters, have strengthened his opinion, always held before, that steel should not be used for riveted bridge work except with the greatest caution, and not without previous full, scientifically arranged, carefully conducted and properly interpreted experiments on a large scale.

Modern bridges are so designed that in their main parts the material is acted upon either by tension or by pressure. Therefore what seems to be needed is not a delicate, sensitive, and often capricious, isotropic material of semi-crystalline structure, but a kind of material which is homogeneous and of excellent qualities in one direction only, of sufficient stiffness, and of sufficient lateral cohesion of its fibres to withstand the inferior secondary strains to which it may be subjected.

There is but very scanty experience in existence as regards steel bridges. But the experience with steel railway axles is much more complete, and the writer in conclusion ventures to remark that the German Railroad Union, comprising nearly 36,000 miles of road, stipulates in its regulations that cast steel axles may be strained 20 per cent. higher than iron axles.

The results of the Harkort experiments, with numerous specimens of the broken girders, of the tensional test girders, diagrams, etc., were exhibited at the Dusseldorf exhibition of 1880, where the writer studied them for two days. We may state that he found nothing but what agrees with the reports of the experiments from which the above abstract was made. With exception of a short review in a report on the exhibition in *Glaser's Annalen*, so far as the writer knows, they have not been published before.

LONDON, Nov. 5, 1882.

CHAS. B. BENDER.

#### Campbell's Automatic Oiler for Locomotive Driving Boxes.

This neat contrivance is illustrated by the engravings, of which fig. 1 represents a perspective view, looking at the

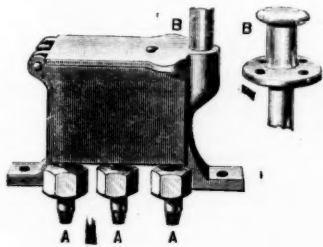


Fig. 1.

side, and fig. 3 a view looking at the top with the cover open. It consists of a box or reservoir for holding oil and wick. This box is fastened to the frame of the engine as near as possible to the spring stirrup. Three pieces of gas pipe A A A, fig. 1, are fastened to the bottom of the box by means of brass pipe-nuts, and are so bent as to reach respectively the box or journal-bearing and the tops of the shoe and wedge on each side of the box. On the inside of the oil box and corresponding to the projections to which the pipes mentioned are attached, are air tubes A A A, fig. 3,

cast with the box, and into these wick is inserted for feeding a regular quantity of oil, which can be regulated by the amount of twist given the wick. Easy access is had to the box by means of a spring lid B, fig. 1. At one end of the box is a projection into which is inserted the supply pipe

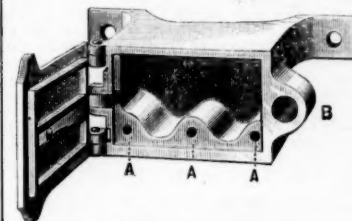


Fig. 3.



Fig. 2.

that extends to the cab or foot-board, and terminates with a plain strong oil cup B, fig. 2, into which the oil is poured while the engine is running if necessary. Four, six or eight such cups are used, according to the number of driving-wheels. Each cup, it is said, will supply oil sufficient for a run of from 400 to 600 miles.

These cups are manufactured by the L. B. Flanders Machine Works, No. 1,025 Hamilton street, Philadelphia.

#### THE SCRAP HEAP.

##### Locomotive Building.

The Hinkley Locomotive Co. in Boston last week turned out two narrow-gauge freight engines for the Addison & Northern Pennsylvania road.

The New York Locomotive Works in Rome, N. Y., are completing an order for a number of freight engines for the Northern Pacific road.

The Rogers Locomotive Works in Paterson, N. J., recently delivered five mogul freight engines to the East Tennessee, Virginia & Georgia road, and are building several more for the same road.

The Washington Iron Works in Seattle, Wash. Ter., recently completed a locomotive for the Gage logging road on the Skagit River.

The Pittsburgh Locomotive works are to build two passenger and two freight engines for the Vandalia Line.

The Cooke Locomotive Works in Paterson, N. J., have shipped 10 of the order of 25 "Mastodon" locomotives for the Central Pacific road. On the first trial one of these engines pulled a train weighing 475 tons up a grade of 105 ft. to the mile, on which there is a 10-degree curve.

##### Car Notes.

The Wason Manufacturing Co. at Brightwood (Springfield), Mass., is building a number of stock cars of a new pattern for the Burton Stock Car Co., of Boston.

The Swissvale Car Co. at Swissvale, Pa., recently completed two handsome Woodruff sleeping cars for the Cleveland, Columbus, Cincinnati & Indianapolis road.

The car shops of Pennock Brothers in Minerva, O., are building 100 flat cars for the Connotton Valley road.

The car shops of the Tennessee Coal, Iron & Railroad Co. in South Pittsburgh, Tenn., are building two coal cars a day.

The Wason Car & Foundry Co. in Chattanooga, Tenn., has a number of orders on hand, and its shops are fully employed.

##### Iron Notes.

The St. Albans Rolling Mill in St. Albans, Vt., has shut down for the present, the reasons given being that the present steel plant cannot supply steel enough to keep the rail mill at work, and that rails cannot be made profitably from imported blooms at present prices.

The Roane Iron Co. in Chattanooga, Tenn., is filling a large order for steel rails for the Western & Atlantic road. The company will shortly make a general reduction in wages.

Swift's Iron & Steel Works in Cincinnati are running full double turn.

The Quinnimont Furnace property, including a blast furnace, coal and ore lands and several coke ovens, on the Chesapeake & Ohio road in West Virginia, was to be sold at public sale on Jan. 25.

The Globe Rolling Mill in Cincinnati is running full double turn, with some large orders to be filled.

The Shenandoah Iron & Mining Co. has started up its Milnes Forge in Page County, Va., after a stoppage of several months. The blast furnace of the company is being put in order ready to start.

We stated a few weeks ago that there had been rolled at the Superior Rolling Mill, Allegheny, a bar of open-hearth steel 6 in. wide, ¼ in. thick and over 300 ft. long, to be used for making a spring for the United States Spring Motor Co., of Philadelphia. We have now to add that a second bar of the same dimensions and material was rolled on Tuesday. Six more are also to be rolled, all for the Motor Co.—*Pittsburgh American Manufacturer*.

The Lookout Rolling Mill in Chattanooga, Tenn., is running single turn, making bar iron.

The Cumberland Steel Works in Cumberland, Md., have been leased by Capper & Co., of Pittsburgh, and started up last week.

##### Manufacturing Notes.

The Western Fence Co., of Chicago, elected the following officers at its annual meeting on Jan. 15: President, T. B. Gault; Vice-President, Sylvanus Burtis; Directors, Wm. A. Stiles, G. G. Calkins, Aaron Gurney; General Manager, Wm. A. Stiles; Secretary and Treasurer, G. G. Calkins. Mr. Gault was recently General Contracting Agent, and succeeds A. K. Stiles as President of the company.

The machine shop of the Great Western Manufacturing Co. in Leavenworth, Kan., was destroyed by fire Jan. 21. The patterns were saved, but the shop and tools will be almost a total loss. Some damage was done to the foundry also. The loss is estimated at \$75,000, and the insurance is about \$25,000. Nearly 400 men were employed by the company.

The Novelty Iron Works of Reeve & Son in Cleveland, O., have a number of orders on hand for bolt and nut machinery.

The Standard Tool Co. has begun business in Cleveland, O., manufacturing twist drills and other fine machinery. The company has \$100,000 capital stock.

J. A. Fay & Co. in Cincinnati have a large order for wood-working machinery for Pullman's Palace Car Co.

Smith, Vaile & Co., of Dayton, O., give notice that they have arranged with Fairbanks, Morse & Co., of Chicago, to carry in stock at various points, a complete assortment, and



to supply the railway trade throughout the United States and Canada and other lines of trade throughout the Northwest, with their steam pumps, stand pipes, etc.

#### The Rail Market.

**Steel Rails.**—Business is quiet, with no large sales reported. As high as \$41 has been asked for small lots for immediate delivery, but the market is very steady at \$40 per ton at mill, while large orders could probably be placed at a little less.

**Iron Rails.**—Quotations are difficult to procure, so few sales are made, and will not be given hereafter, unless some special sale is noted.

**Rail Fastenings.**—Spikes are lower, and are quoted in Pittsburgh at \$2.80 per 100 lbs., with fair demand. Splice-bars or fish-plates are still quoted at \$2.40 to \$2.50 per 100 lbs.; track-bolts, \$3.50 to \$3.75 for square nuts, and \$3.75 to \$4 for hexagon nuts.

**Old Rails.**—The market for old iron rails is dull and weak. Some small sales of American tees are reported at \$26 to \$26.50 per ton in Philadelphia, and \$27 in Pittsburgh. Double-heads have been offered at \$28 in Philadelphia, with no buyers.

#### A Snow Wreck in Arizona.

A dispatch from Albuquerque, N. M., Jan. 21, says: "On Thursday evening an engine on the Atlantic & Pacific Railroad while trying to force the blockade of snow between Coolidge and Fort Wingate jumped the track. A second engine came to the rescue, but, not being able to render the needed assistance, two more engines were telegraphed for from Coolidge. These started for the scene of the accident at full speed, and in the blinding storm nothing was seen in the way, when suddenly a tremendous crash occurred and fragments of four 60-ton engines were piled up on the road-bed. Charles Lakin, an engineer, and his fireman were seriously bruised, and several others were slightly injured.

"Friday afternoon the men working on the wreck being exhausted from fatigue and cold, Coolidge was again asked for assistance, when two more engines, with a way-car loaded with workmen, started for the scene of the accident. The snow was blinding and the wind blew so terrifically that no object could be seen ahead, and the rescuing train, sweeping along the track, went crashing into the wreck of the other four engines, adding tenfold to the confusion already existing. Both the engine and way-car were completely wrecked, but strangely no one was seriously hurt. The storm was the worst known for years. The danger lights were completely covered up and the intense cold made it impossible for the signal men to be out."

#### Investigating Accidents.

Even the prospect of an investigation does good sometimes; at any rate it seems to be an effective threat. Assistant Superintendent Priest of the New York Central has put the following general order on the bulletin boards at Albany, Utica, DeWitt, and Syracuse:

"All Conductors, Brakemen, Firemen, and other employees:

"The law now provides that the new Railroad Commission shall investigate all railroad accidents and bring the guilty parties to justice. Remember that you will not have a coroner's jury to deal with, but a Commission—that will see that guilty parties are prosecuted as the law directs, and none will escape.

"Conductors, we are having too many rear collisions. You must not fail to send back brakemen with proper signals and torpedoes in all cases of detention, and see that they go back. If your men are not reliable, answer. Take no chances, but invariably be on the safe side, and have men back with red signals and torpedoes. In case of stormy weather, when signals cannot be seen, or there is any doubt about it, have torpedoes used in addition to signals, and instruct your men how and where to use them."

#### The Governor of Texas on Railroads.

In his message to the Legislature the retiring Governor of Texas says: "The law authorizes the Governor to appoint some person to act as State Engineer, who shall have the right and power to compel all railroads that connect with each other in this state to make their connections regular and proper so as to accommodate the traveling public on said roads, and the right and power to compel said companies to draw the passengers and freight of each other on their respective roads and cars; and upon a refusal to comply with these requirements such person shall take charge of the road and rolling stock and report it to the Governor. The said road shall then be run for the benefit of the state until satisfactory arrangements are made for a compliance with the law.

"Although the attention of the Legislature has been previously called to this law no appropriation has ever been made to pay the Engineer nor to defray the necessary expenses of taking charge of and of running a railroad.

"Any attempt to have enforced it would have been futile. Numerous cases may have happened that should have been remedied, but the means of obtaining authentic information of them even were not at my command. Indeed, the great defect of our railroad laws generally has been the want of adequate and practicable remedies to enforce what is legally required of them.

"Combinations and pooling may be made, the road-beds may be out of order, the rolling stock may be defective or insufficient, preferences may be given to particular places and persons, and numerous other injuries may be done to individuals and to the public, without there being any appropriate remedy. Suits for forfeiture and for damages, and statutory threats to take possession of the roads, are either too remote, trivial, or impracticable to correct wrongs done by great moneyed corporations, in a way to prevent their continual recurrence. It will never be otherwise until the state undertakes the correction, by remedies acting directly on those who manage and control the roads and the business transacted on them.

"Previous to the passage of the law repealing the laws granting certificates to railroad companies, at the special session of 1882, applications had been made to me for orders granting certificates to several companies, which were refused by me under that clause of the law relating to the inspection of a road, which required it to be reported 'that the same had been constructed in accordance with its charter, or the general laws under which it may be constructed, or with laws in force regulating railroads.' The default generally was in the failure in point of time to build the road the distance required by the charter or by the law."

#### Railway Speeds and Fares in England.

The following letter to *The Engineer* will be of interest at this time in connection with the discussion of this subject. The correspondent says:

"The accompanying facts about the nine great railways which start from London, I believe may be of interest to your readers. To compare the merits of one railway with another, it is necessary to consider the speed of the trains, the number of trains, and the price of the tickets.

"For the purpose of the following table, I have taken the six fastest journeys, three up and three down, between London and each of six most important towns upon each railway system; and the average speeds are, therefore,

those of the 36 fastest journeys thus performed. As the same trains frequently run to more than one of these towns, their number averaged is less than the number of journeys, and it is fair to remember that the fewest trains may probably show the best averages. The fastest average speed to any one place is to Nottingham by the Midland, at 46.4 miles per hour. The highest fares charged are to Folkestone and Dover by the Southeastern expresses, being 3.4d. and 3.8d. per mile. These tables appear to show finally that the northern lines are cheapest and fastest; the western and eastern lines are fast and rather expensive, while the southern lines are both slowest and dearest; and, moreover, the Southeastern, the London, Chatham & Dover, and the London, Brighton & South Coast are the only ones on which express fares are charged:

RAILWAYS.	Trains a week.	Average miles per hour.	Fastest run of over 50 miles, miles per hour.	Longest run without stop, miles.	Average fares per mile.	
					1st class.	2d class.
Great Northern.....	24	42.1	50.3	105 1/4	d. 1.6	d. 1.2
Midland.....	23	40.6	49.7	97 1/2	1.6	1.2
London & N. W.....	27	39.4	48.2	91 1/2	1.7	1.3
Great Eastern.....	23	38.4	44.5	70 1/2	2.1	1.6
Great Western.....	21	37.5	43.5	106 1/2	1.9	1.4
London & S. W.....	22	36.1	44.3	48 1/2	2.4	1.7
London, Chatham & Dover.....	25	34.6	44.5	78	2.5	1.8
London, B. & S. Coast.....	32	34.4	43.1	55 1/2	2.5	1.8
S. Eastern.....	34	33.7	44.4	75 1/2	2.4	1.8

"The above figures are based upon the various companies' time-tables for September last."

#### Neatness in Passenger Cars.

The Superintendent of the Genesee Valley road in New York has issued the following order to the passenger conductors on the road: "Notice to passenger conductors: Spittoons will be placed in the ladies' cars on the Rochester Division, and your brakemen, in case they find any one spitting on the floor, are to move a spittoon to them and politely ask them to use it. Two boxes of blacking and a blacking brush have also been furnished each passenger car, and we expect every man on passenger trains to use them. Please say to your crew that the maintaining of a neat appearance on duty will be considered an important factor in selecting men for promotion."

#### A Hand-Car Trunk Line.

They have up in Oregon a railroad which does a profitable business, although a hand-car and a push-car constitute its entire equipment. The road, which is about five miles long, was formerly used by the Utter Coal Co., but upon its suspension a few years ago the engine was taken off, a hand-car substituted, and a lucrative business in freight and passenger carriage built up, the charge being \$2.50 per ton for freight and 50 cents for passengers. The engineering of the road challenges comparison. Although running across marshes and along hillsides where construction is comparatively easy, it curves like the track of a serpent, and is the only road in existence where a curve is made to get around a stump.

#### The Battle of the Gauges.

A collision between standard and narrow-gauge railroad trains is a rarity. At Benton's Switch, about two miles from Eldred, on Monday, the local freight No. 10 on the Buffalo, New York & Philadelphia Railroad, going south, Bob Jones conductor, ran into a Kendall & Eldred special train, going to Bolivar, Peter Moran, conductor. The narrow-gauge train stopped before the collision. Both locomotives were damaged, but no one was injured. Passenger trains Nos. 3 and 4, on the Buffalo, New York & Philadelphia were delayed two hours, and passengers were transferred around the break. The Kendall & Eldred narrow-gauge with a third rail uses the Buffalo, New York & Philadelphia track from Eldred to White House.—*Buffalo Express*, Jan. 17.

#### Attempt at Train Wrecking.

On the night of Jan. 20 a passenger train on the Amboy Division of the Pennsylvania Railroad struck a heavy timber which had been laid on the rails on the bridge over Crosswicks Creek, near Yardville, N. J. The train was running at a fair speed, and struck the log with such force as to drive it through the bridge floor, tearing out several ties, but doing no other damage, the engine remaining on the track.

#### Killing a Ghost.

Some strange stories have lately been told by some of the engineers on the Philadelphia & Reading Railroad regarding an apparition that has made itself conspicuous at different points of the line and in situations generally considered unsafe by persons of mortal mould. The road has been free from personages of this character for many years, and were it not for the late appearance of the wraith of 10 years ago would probably have been forgotten. Several years ago, as the legend runs, a ghost made his headquarters for some time near the water tank at Valley Forge station. This particular ghost was supposed to be the shade of an Ethiopian who had been killed while walking on the track. Experience seemed to be of no value to the darkey's shade, for the latter invariably occupied the middle of the track and was run over, night after night, with great regularity but apparently without any damage to a well developed figure. Some time prior to the appearance of the ebony shade a ghost of Caucasian extraction was seen at Port Kennedy. Engineer Curry is said to have seen it with his own eyes, a circumstance which is supposed along the line to place its appearance above question. The engineer first saw it about 3 o'clock one fine morning. He was standing at his post thinking of things terrestrial when suddenly a figure in white loomed up before his astonished vision. According to his account, it was 10 ft. in height, and he passed so close to it that he touched it. It was standing on the middle of the track, the favorite position, and seemed to experience no inconvenience from the presence of the locomotive, which sailed through it without causing the slightest variation in its features, which were a picture of contentment. The most recent appearance occurred within a week. This particular wraith showed up ten days or two weeks ago for the first time. It is said that among others, engineers Dave Lome and Wallace Welsh saw it. The former is a day engineer, and some railroaders are sceptical enough to question his ability to see a ghost during daylight. Welsh is a night man and lives at Mount Carbon. He is said to have seen the spectre at Royer's Ford, and the ghost is known along the line as the Royer's Ford ghost. According to all accounts, the spectre was in all respects of a conventional type—always dressed in white, of a diaphanous texture, a trifle bulky, yet agile and graceful in its movements. Like the rest of its tribe, it displayed a

strong affection for the middle of the track, and to this error of judgment may be ascribed its untimely end. It hasn't been seen since last Tuesday night. On that night the drivers of engineer Kinney's locomotive were covered with blood when he arrived at Pottstown. So far as known, nothing mortal was killed on the night in question; yet the railroaders say that there is no doubt of the fact that blood was found on the wheels of the locomotive. At any rate, the latest spectre of the Reading Railroad hasn't been seen since, and as a railroader said last evening: "If the ghost wasn't killed on Tuesday night, why hasn't it shown up since, and who was killed?"—*Pottsville (Pa.) Miners' Journal*, Jan. 19.

#### Surveys of the Anthracite Coal Regions.

At the regular meeting of the Engineers' Club of Philadelphia, held Dec. 16, Mr. Ashburner presented the following: "I desire to call the attention of the Engineers' Club to the first finished maps and sections of the Anthracite Survey (2d Geological Survey of Pennsylvania), and to state briefly the general plan of publication which has been adopted. Thirteen sheets have just been engraved and printed, to illustrate the mining and structural geology of the Panther Creek basin, which lies at the extreme eastern end of the Southern coal field between the Little Schuylkill River at Tamaqua and the Lehigh River at Mauch Chunk. These illustrate the character of the charts which will be constructed in the other parts of the region.

"The basis for the work is the surveys of the corporate and individual coal operators in the region, which have been made with so much care and precision. These are afterwards connected and extended by the field work of the Geological Survey corps. The charts are to be published of uniform size (26 in. by 32 in.), and on the following scales:

"1. Mine maps, showing the mine workings and the structure of the coal-beds, by underground contour curves 50 ft. vertically apart. Scale 800 ft. = 1 in.

"2. Topographical maps of the surface of the coal basins, in contour curves 10 and 20 ft. vertically apart. Scale 1,600 ft. = 1 in.

"3. Vertical cross sections of the coal basins. Scale 400 ft. = 1 in.

"4. Columnar sections of the coal measures, showing the relation of the coal-beds and the character of the rock intervals. Scale 40 ft. = 1 in.

"5. Columnar sections of the individual coal-beds. Scale 10 ft. = 1 in.

"These sheets will be supplemented by others of a miscellaneous character.

"As the charts illustrating the individual districts shall be completed, they will be immediately published and issued, with a brief explanatory report of the special features which they represent. The general geological report of the region will not be published until the survey of the entire field is completed. This plan will very much lengthen the work, but will insure the practical value of the results.

"Up to the present time the survey of the Panther Creek basin, between Mauch Chunk and Tamaqua, has been completed. The surveys of the following basins are nearly finished: Wilkesbarre, between Shickelshinny and Wilkesbarre (Northern coal field); Green Mountain, Black Creek and Hazleton basins (Eastern Middle coal field); and that portion of the Mahanoy and Shenandoah basins (Western Middle coal field), lying between Delano and Ashland. This leaves about two-thirds of the region entirely untouched. Two years have already been devoted to the work, and the districts which are yet to be surveyed are the most difficult, and will probably, therefore, require a greater proportional amount of work. It is impossible for me to estimate when the Anthracite Survey can be completed on the system of survey which has been adopted."

#### Jumping off the Train.

"I missed having an item for you to-night by just about an inch," remarked one of a party of railroaders Sunday evening to a *Journal* reporter. "The escape happened at Bridgeport," he continued. "A horse and closed carriage was on the crossing when we ran in sight. The driver didn't hear us until we were almost on him. He hadn't time to cross, so he did the best he could and jerked his horse around until horse and wagon stood parallel with the track. He just made it. The turn was so sudden that the wagon was partly tipped over. The driver stood up and leaned away from the train. The horse must have understood the situation, as he stood stock still. I think the cars must have grazed the wagon, as the driver got out and looked at his wheels after we passed. It looked like a sure case of kill to us, but it wasn't." "He was one of the lucky ones like that fellow at Reading the other day," chipped in another conductor. "The man tried to board the train at Penn street. It's no use telling them not to take risks; they'll take them all the same. He caught hold of the middle car. He was jerked off his feet, and he looked to us like a wooden-legged man sure. If he let go, his legs were bound to go on the rails, and the next car would do the business for him. He was plucky, though. He hung on, and was dragged as far as Cherry street. There a couple of men caught hold of him and pulled him out of the way. He didn't ride on that train, but he was able to walk on his own legs after he recovered from his faint. No, his hair didn't turn gray, but it took the best part of a half-pint of whiskey to put life into him." "Well," said a brakeman, "he was in more luck than the fellow who wanted to get off at Penn street a few days ago. He asked me if he could get off. I told him it was against the rules and he mustn't do it while I was around. He waited until I wasn't. You know the train pulls out as we get to Penn street." The rest of the party nodded and smiled as if they saw the unfortunate passenger doing his act. "Well, just as Mike put on steam," added the brakeman, "he jumped. He had a box in his hand. He wasn't a professional jumper. The moment his feet touched the ground he tried to beat the train. He crossed the street in one jump, and on the way he turned five somersaults. The box beat him by a yard. I hadn't time to see which was the worst broke up." "It's a wonder," remarked another railroader, "that more accidents don't happen on the road. In spite of all the advice you offer and all the warnings they've had, people will persist in jumping off trains before they stop and try to get on after they've started. Nothing but an accident will satisfy this class, and in the course of time they are all satisfied. I remember one case in particular. A man got on at Pottstown some time ago. He had a ticket for Reading. He also had a big load on; couldn't stand straight even when the train wasn't going. As soon as we entered the outskirts of Reading he wanted to jump off. I wouldn't let him and put him back in the car. I stood guard over him until we were almost at the station. I was called away for an instant. When I got back my man was gone. I ran to the platform just in time to see him fall between the cars. We were within a car-length of stopping and the train had to run past the depot to allow us to get our man out. Both legs and an arm had been cut off. His skull was crushed in and he was dead enough to be buried. If he'd waited for two seconds he couldn't have been hurt." "There's probably not one man in a thousand" spoke up another trainman "who knows how to jump on or off a moving train, or if he does know, puts in practice his knowledge. Take the general run of people who jump off moving trains and when a man



jumps he'll jump with the train. By so doing he adds his own momentum to that of the train. As a natural consequence he loses his balance and goes head over heels until the obstructions he meets with counteract the other force. The chances are that when this happens he's either badly bruised, or, more probably, badly injured, even if he keeps out of the way of the cars, and his chances of being struck by them or falling on the rails are pretty good. When the average man tries to board a moving train he makes the same error. If he has to run for it he'll run hard until he clutches the hand rail. Then he stops running. The consequence is, if he has a strong grip he's jerked off his feet, and in such a manner that, unless he has a powerful arm, he is thrown under the wheels. If a man must board a moving train his only chance after running with it is to jump on the step and clutch the hand rail at the same time. Even then the chances are against him. If he wants to get off a train running at moderate speed his best chance is to step in the opposite direction to that in which the train is running. Only long practice will enable him to do this and even with it he's liable to get hurt."—*Pottsville (Pa.) Miners' Journal*.

#### New Pullman Cars in England.

Two new sleeping cars, specially constructed by the Pullman Company on what is called the English pattern, arrived on Tuesday night at King's Cross station. These carriages differ from those at present in use in having side entrances, thereby dispensing with the end platforms, and in being divided into four compartments, so as to combine the comfort, and, to a certain extent, the privacy of an English first-class carriage with the convenience of the sleeping car. Each compartment contains cushioned seats as well as berths and beds for four persons. There is a continuous passage from one end of the car to the other for the use of the attendant, but ordinarily each section is separated from the rest by doors and curtains. The new cars are each rather over twelve yards long and weigh about thirteen tons. They were built in America, shipped to England in sections, and put together and finished at Derby, and have been named "Balmoral" and "Cullross."—*London Iron*.

#### Attempt at Train Robbery.

A dispatch from Salt Lake, Utah, Jan. 23, says: "At 1:30 yesterday morning an attempt was made to rob the Central Pacific express car at Montello, a wood and water station just over the Nevada line. Six or eight robbers ordered the engineer of the west-bound train to move on and then took possession of the east-bound train. One man guarded the engineer while the others watched the passenger cars and attempted to enter the express car. Ross, the express messenger, kept his doors closed and fired upon the highwaymen, who smashed in the panels of the door and built a fire under the car to burn Ross out, but failed. Ross was badly wounded in the left hand. The conductor and brakemen were imprisoned in a tank-house. The robbers secured only \$10, which they took from the conductor. The train was delayed nearly two hours. Twenty men left Elko in a special train to track the robbers."

#### A Troublesome Lounger.

A station-master in India telegraphed 200 miles to the central authorities: "Tiger jumping about on platform. Please telegraph instructions." The fact is that the station-master was unable to get to the signal-station owing to the presence of a tiger on the platform, and, in order to avoid an apprehended collision, he telegraphed to the head office for instructions to be sent to the next signal-box that an approaching train might be stopped in time.

#### The Prevention of Smoke.

In commenting on steam boiler furnaces the *London Engineer* says:

"All our experience, extending over many years, goes to show that when the production of smoke is prevented by special devices for admitting air, either there is an increase in the consumption of fuel or a diminution in the production of steam. A noteworthy instance of this came under our notice recently. An extremely simple and elegant device for preventing smoke was submitted to an engineer. He was so much pleased that he had it fitted to the furnaces of a large Lancashire boiler, one of a pair, either of which could be used at will. An experiment was made by firing the boilers alternately week about, the same coal being used, and the same work being done by the engine, the same fireman being employed. The result was that smoke was practically entirely prevented; that there was no reduction in the steaming powers of the boiler; that the invention gave the fireman no trouble, and required no attention, and that the consumption of coal was increased by about 2 cwt. per day. The best smoke-preventer yet devised is a good fireman; and, providing the boiler is large enough for its work, the coal fairly good, and that the air is admitted—not too much—in a thin sheet, as by a Martin's fire-door, such a man will prevent the production of smoke and get admirable results."

#### The Steamship "Oregon."

The *London Engineer* gives the following account of the "Oregon," a new steamer for the Guion Line:

"It is anticipated that she will be ready for her trial trip about midsummer, and she is intended to excel in speed the fastest ship now afloat. She will not be much larger than the 'Alaska,' but her engines are to indicate no less than 13,000 horse power. She will have but one screw, as we understand about 24 ft. in diameter, with a pitch of nearly 40 ft. Steam will be supplied by 12 boilers, each with 6 furnaces 3 ft. 6 in. diameter, the grates being a little over 6 ft. long. We may compare her with the 'Alaska,' which ship has 9 boilers with 6 furnaces in each, of about the same size. Comparing grate areas, we find that the aggregate surface in the 'Oregon' will be 1,512 square feet, divided among 72 furnaces, while that of the 'Alaska' is 1,134, divided among 54 furnaces. As the 'Oregon' will burn about 20 lbs. of coal per square foot of grate per hour, her consumption in 24 hours will not be much under 300 tons, and allowing that each ton of coal evaporates 9 tons of water, we find that no less than 2,700 tons of steam will pass through her engines every 24 hours. A tank 100 ft. square, to hold 2,700 tons of water, must be nearly 10 ft. deep to prevent the water from running over the edge. If the tank were 50 ft. square, the water would stand 38 ft. 10 in. deep in it. If the water were supplied to a town, allowing 4 cubic feet or 25 gallons per head per day, it would suffice for a population of 24,000 souls; 6,000 tons of air will pass through her furnaces, representing a volume of 174,720,000 cubic feet through a pipe 11 ft. 4 in. diameter. This volume of air would flow at the rate of 13.8 miles per hour, a strong breeze to walk against. The total weight of water evaporated on the run across the Atlantic will not be far short of three times that of the whole ship's cargo, engines and all. We give these figures to enable our readers to form some idea of what 13,000-horse power means; and we may supplement them by adding that it is equivalent to 191,517 tons lifted a foot high every minute, or the same weight lifted 1,440 ft. in 24 hours. Assuming that she makes 20 knots an hour, or, omitting fractions, 2,028 ft. per minute, the thrust of her screw—that is to say the force pushing her

ahead through the water—will amount to over 94 tons, or about as much as 20 of the most powerful locomotive engines in England would exert if all were pulling at her together. Among the other difficulties which crop up when we have to deal with such enormous powers as these figures represent, we mention that of getting the coal to the fires. We see that in the case of the 'Oregon' no less than 300 tons a day, the full load for a coal train of 30 trucks, will have to be handled every 24 hours. If the ship were at rest, the problem would not be easy of solution, but it becomes very hard indeed to deal with in a rolling and pitching vessel. All is done, of course, that can be done in arranging boilers and bunkers to accommodate each other, but it is evident at a glance that out of a total quantity of, say, 2,500 tons of coal a great deal must be stowed at a considerable distance from the furnaces. It does not appear that any mechanical device has yet been hit on in the way of a railway which answers better than the existing arrangements, by which the whole of the work is effected by sheer manual labor."

#### English Fast Passenger Engines.

The express passenger engine having 18-inch cylinders and four-coupled 7 ft. driving wheels, with four-wheeled bogie in front, under the smoke-box, designed by T. W. Johnson, for the traffic of the Midland Railway (England), is supported on a wheel-base of 21½ ft. in length. The engine weighs about 42 tons in working order, and with tender, including coal and water, about 68 tons. The average load taken by engines of this class is 14 carriages, at the time-table speed of 50 miles an hour, over gradients of from 1 in 120 to 1 in 130, with a consumption of 28 lbs. of coal per mile run. The engine can take, as a maximum load, 17 carriages between Manchester and Derby, either way over ruling gradients of 1 in 80 and 1 in 100 for 10 miles, at a speed, up the grades, of 35 miles per hour; and on a level, or on falling gradients, at 50 miles per hour. The curves on the Manchester line are very frequent. The carriages weigh, with passengers, 11 tons each, making a train of the gross weight of 187 tons. The express passenger engines on the Great Northern Railway, designed by Mr. Patrick Sterling, having 18-in. cylinders, and 8-ft. single driving wheels, weigh, in working order, about 38 tons, of which about 16 or 17 tons weight is upon the driving wheels. They work the express trains between King's Cross and York. Engines of this class take trains of from 16 to 22 carriages. On one occasion a run of 15 miles was made in 12 minutes, with 16 carriages of from 10 to 12 tons each. These engines can take a gross load, including the engine and tender, of about 350 tons, on a level, at a speed of 45 miles per hour, with a steam pressure in the boiler of 140 lbs. per square inch.

#### ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette*:

Page.	Page.
Atchison, Topeka & Santa Fe..... 7	Maine Central..... 21
Boston & Lowell..... 23	New Haven & Northampton..... 7
Charlotte, Col. & Augusta..... 23	N. Y. Cen. & Hudson River..... 7
Chicago, Bur. & Quincy..... 7	N. Y., New Haven & Hartford..... 22
Cincinnati, N. O. & Texas Pac..... 39	Philadelphia & Reading..... 22
Cleveland & Pittsburgh..... 39	Pittsburgh & Lake Erie..... 40
European & North American..... 40	Rochester & Pittsburgh..... 41
Pittsburgh..... 40	South Carolina..... 39
Hartford & Conn. Western..... 7	Western R. R. Association..... 37
Houston & Texas Central..... 39	Worcester & Nashua..... 40

#### Columbia & Greenville.

This company owns a line from Columbia, S. C., to Greenville, 143 miles, with two branches, 21 miles, and works under contract the Blue Ridge road, 33 miles, making 197 miles in all. It also leases the Laurens road, 31 miles, and the Spartanburg, Union & Columbia, 68 miles, their earnings being stated separately.

The earnings of the 197 miles worked directly for the year ending Sept. 30 were as follows:

Earnings (\$3,092 per mile).....	\$600,136
Expenses (73.1 per cent.).....	444,949
Net earnings (\$833 per mile).....	\$164,187

The earnings reported were the lightest for some time. The earnings of the leased Laurens road, which is practically owned also, were:

Earnings (\$1,066 per mile).....	\$33,044
Expenses (111.6 per cent.).....	36,847
Deficit.....	\$3,803

The statement for the Spartanburg, Union & Columbia road is as follows:

Earnings (\$1,492 per mile).....	\$101,470
Expenses (89.0 per cent.).....	90,370
Net earnings (\$163 per mile).....	\$11,100
Rental.....	50,000
Deficit for the year.....	\$38,900

The gross revenue as compared with the previous year shows a decrease in receipts as follows:

Columbia & Greenville.....	\$46,650
Spartanburg, Union & Columbia.....	6,412
Laurens Railway.....	6,903
Total.....	\$59,965

This decrease arises from the short crop of the year. The income account was as follows:

Net earnings of road owned.....	\$104,187
Interest, funded debt.....	\$180,000
" floating debt.....	13,828
Loss on Laurens road.....	3,803
" Spartanburg road.....	38,900
Total.....	236,531

Deficit for the year..... \$23,344

Improvements and new equipment on road owned.....	\$3,465
" " " on Laurens road.....	2,304
" " " on Spartanburg road.....	25,700
Total deficit.....	\$183,813

The report says: "The increase in expenses is largely due to the necessary repairs to the roadway over the ordinary operating expenses of a road in good condition, and increase in taxes. The physical condition of the company's property has been greatly improved during the past year by large repairs and replacement of what was worn, and addition in the roadway, equipments and machinery department."

"The good results to follow this expenditure will be greater safety, facilities to handle our business economically, and a decrease in the operating expenses in the future."

"Our floating debt has been increased by the purchase of 2,000 tons of steel rails, a portion of which has not yet been put in track."

"With the abundant crops of the past season and the general prosperity of the country we anticipate a considerable increase in revenue this year over that of last."

#### Grand Trunk.

The half-yearly report of this company says: "The deed effecting the union of the late Grand Trunk Railway Co. of Canada and the late Great Western Railway Co. (of Canada), dated May 25, 1882, was duly approved and ratified at special general meetings of the proprietors of the two companies respectively, held on June 29 and Aug. 10 last; and the united company was under that deed entitled 'the Grand Trunk Railway Co. of Canada.' The directors appointed by the deed of union accordingly assumed control of the affairs of the company from the date of union, Aug. 12, 1882. Viscount Bury shortly afterwards resigned, and under the deed of union no other director has been appointed. In accordance with the provisions of the deed of union, the directors have wound up the affairs of the Grand Trunk and Great Western companies, and have finally balanced the books of the two companies to the date of union; and they now present to the proprietors' statements of accounts, in the case of the Grand Trunk Co. from Jan. 1 to Aug. 11, 1882, and of the Great Western Co. from Feb. 1 to Aug. 11, 1883. The accounts have been prepared in the forms hitherto adopted by the companies respectively."

#### GRAND TRUNK ACCOUNTS.

The earnings and expenses were as follows, the mileage having been increased from 1,417½ to 1,480 miles by the opening of an additional section of the Georgian Bay & Lake Erie Branch,

	1882	1881	Inc. or Dec.	P. c.
Earnings.....	\$1,334,457	\$1,311,485	\$22,972	1.8
Expenses.....	954,954	918,730	36,224	3.9
Net earnings.....	\$379,503	\$392,755	\$13,252	3.4
Per cent. of exps.....	71.56	70.05	1.51	....

The passenger-train receipts increased \$84,707, or 21.2 per cent., while the freight receipts decreased \$64,893, or 7.1 per cent., on account of low rates.

The passengers and freight carried were as follows:

	1882	1881	Increase	P. c.
Passengers.....	1,688,997	1,324,450	364,547	27.5
Tons freight.....	2,131,008	2,082,378	48,630	2.3

The average receipts per passenger carried was 62½¢, against 65¢, in 1881, and per ton carried, 95¢, against 104½¢ in 1881. The income account was as follows:

Net earnings.....	\$379,503
Interest, International bridge.....	25,457
" Chicago & Grand Trunk.....	12,459
" Capital temporarily employed.....	15,318
Total net receipts.....	\$432,737
Interest, perpetual debentures.....	\$130,500
" equipment bonds.....	27,173
" land loans.....	724
Rentals.....	104,254
Total.....	\$695,394

Surplus.....	\$170,086
Balance, Jan. 1.....	498
Total.....	\$170,584

Dividends on first and second preference stock, 3.071 per cent..... 170,160

Balance, Aug. 11..... \$424

The net amount charged against capital account was \$121,269, of which the sum of \$31,413 was for new construction and \$104,639 for new equipment, the total charge being \$170,294, from which is deducted \$49,025 for sales of land and premises on new debenture stock sold.

#### GREAT WESTERN ACCOUNTS.

The gross receipts of the Great Western from Feb. 1 to Aug. 11 were:

Earnings.....	\$466,091
Expenses.....	351,930
Net earnings.....	\$114,161
Interest, loss on leased lines, etc.....	100,760
Surplus.....	\$4,401
Balance, Feb. 1.....	2,917
Total.....	\$7,318

This surplus being insufficient by \$6,082 to meet the dividend on the Great Western 5 per cent. preference stock to Aug. 11, that amount has been set apart out of items at credit on the books of the company at that date, in conformity with the deed of union. Warrants for the dividends on the 5 per cent. preference stock for the period from Feb. 1 to Aug. 11, amounting to \$13,400, were posted to the proprietors Dec. 22.

The revenue accounts of the Great Western Co. not having been made up Aug. 11, 1881, no exact comparison of the receipts and expenditure can be rendered to the date of the union. The accounts for the half year ended July 31, 1882, as compared with those to July 31, 1881, show the earnings, working expenses, and reserve fund, as follows:

	1882	1881	Inc. or Dec.	P. c.
Earnings.....	\$433,990	\$409,442	\$24,548	6.0
Expenses.....	333,102	330,005	3,097	0.9
Net earnings.....	\$100,888	\$79,437	\$21,451	27.1
Per cent. of expenses.....	76.75	70.30	6.45	....

Passenger receipts increased \$24,145, or 15.1 per cent., but freight receipts decreased \$59,882, or 20.3 per cent., on account of the very low rates on through freight.

The earnings per train mile in 1882 were 58½¢; expenses, 44½¢; net earnings, 14¢ per mile.

On Aug. 11 the credit balances of the various renewal funds were as follows: Ferry steamers, \$36,024; locomotives, \$104,889; cars, \$23,417; rail and bridge, \$9,549; insurance fund, \$2,055, making a total of \$175,934. Deducting \$36,813 to debit of leased lines accounts, the total balance of these funds was \$139,121.

The charges to capital account from Feb. 1 to Aug. 11 amounted to \$58,852. The balance at the debit of capital account at the date of the union was \$4,157.

The sum applicable to the acquisition of Wellington, Grey & Bruce bonds, under the provisions of traffic agreements with that company, amounted on July 11, 1882, to \$3,807. Bonds to the amount of \$3,800 have accordingly been drawn. The numbers of these have already been published, and the bonds are payable at par at the offices of the company on and after Jan. 1, 1883.

#### GENERAL REMARKS.

The report says: "The first ordinary general meeting of the holders of capital in the united company entitled to vote at such meeting is fixed by the deed of union to be held in the month of March, 1883, of which due notice will be given. The accounts of the company from the date of union, Aug. 12 to Dec. 31, 1882, will then be formally submitted to the proprietors. Meanwhile, the directors congratulate the proprietors on the benefits already derived from the joint working of the two systems; on the marked success which has so far attended the substitution of identity of interest and unity of management in the place of separate control and continual dissension; and on the commencement of a new era with improved prospects, under arrangements equitable to the various interests involved, and satisfactory to all classes of the proprietors of the now united company."





Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

#### EDITORIAL ANNOUNCEMENTS.

**Passes.**—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

**Addresses.**—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subject pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

#### THE EDUCATION OF ENGINEERS.

The editorial article which was published in the *Railroad Gazette* of Nov. 10 of last year with the above title has, as our readers know, been criticised quite freely by several correspondents. As the pursuit of truth and righteousness is the only worthy object of such a discussion, no note, excepting this, will be made of what a chemist would call an occasional "trace" of acerbity in the discussion, excepting so far as the consideration of the questions involved may perhaps reveal the cause which, evidently, gave offense to some of our critics.

Since the original article and the discussion thereon were published, a criticism of Herbert Spencer's "Theory of Education," by Mr. E. R. Sill, has appeared in the *Atlantic Monthly* for February, in which the author says:

"The thing, after all, that is of most service to a man in making his way in the world is to be, first of all, an intelligent man; and this intelligence it is precisely the purpose of education to give him. He will be able to get his handy information for himself afterward, in one direction or another, as happens to be most useful to him. The ability to read, in the largest and highest sense, that is to say, the ability to get the full benefit of other men's minds and experience from their written words, and the ability to think—these are gifts bestowed by a liberal education, that are worth any amount of a particular set of facts."

The words express with great distinction the theory not only of education generally but of that of engineers held by the author of the article which started this discussion, and it was this unexpressed theory which promoted the writing of the article referred to. The chief value of education to an engineer, as well as to other persons, is in the mental discipline which it gives, just as that of gymnastics is in the bodily strength and activity which comes from it, and not from any useful purpose served by the acrobatic feats which are learned and can be performed—unless, possibly, the gymnast may be in training for the arena of a circus.

The enormous value of the mental discipline which Mr. Spencer's critic says gives "the ability to get the full benefit of other men's minds and experience from their written words, and the ability to think," perhaps no one is in a better position to appreciate than the editor of a technical paper. The importance and comparative rarity of such training manifests itself to him in a quite uncomplimentary way, when he discovers that so few read those productions to which he devotes the most time, thought and labor in writing. It may be well to anticipate the remark, that it is conceivable that the obdurate dullness of the editor may be a reason why his writing is eschewed, but on the other hand he can seek refuge from such railery in the fact that those things to which he gives little

thought and time in writing are read more than those which require much work in their production.

The value of a certain measure of mental training will also be apparent to any one who has much intercourse with the subordinate, and some of the principal, officers of railroads. The want of it shows itself very distinctly in the meetings of associations like the Master Mechanics' and Master Car-Builders. There are among the members of these associations, it is true, men of a high degree of mental training, and more with an immense endowment of strong natural good sense, and those who belong to either of these classes are usually constant and intelligent readers of current and standard literature relating to their occupations. Those who show a lack of mental training are the men who began in the ranks and who are quite incapable of getting "the benefit of other men's minds and experience from their written words." It is difficult for those who have been accustomed from childhood to the companionship of books and to habits of more or less logical and consecutive thought to realize how indefinite, unreal, vague and obscure the contents of books, and written words generally, are to such men. To them the knowledge and information obtained from writing has a kind of mythical relation to that which they acquire and become familiar with through observation and experience. The latter is a real thing, the other a kind of hearsay not worthy of implicit credence, no matter by what authority it may be supported. They become confused by very simple processes of deduction, and are totally unable to sift the evidence on which any conclusions are dependent. Their knowledge and belief are a curious mixture of experience, prejudices and a kind of superstition regarding mechanical and scientific matters, which is sometimes pathetic by reason of a blind trustfulness which goes with it. Let any one look over the reports made to either of the two associations named by committees of investigation, and he will see how little capacity some of them, who prepared the reports, have of dealing with any considerable aggregation of facts, of reasoning about them, or of deducing correct theories regarding the subjects discussed.

Such men are often not backward either in showing their contempt for anything like a complicated array of facts, or process of reasoning. "Damned nonsense," is the generic term by which they are apt to consign to oblivion all intellectual effort beyond their comprehension. The hopelessness of this undeveloped state of things only those can know who have found it in positions of authority and have attempted to influence it. It represents a type of engineer that is produced without education.

Now, to quote again from the writer in the *Atlantic Monthly*: "The plain fact is, that the one thing which wild nature never yet did, and never can be depended on to do, is to make intellectual, or even decently rational, men and women out of the common stuff of humanity."

It is not said that some person's minds may not be developed without a scholastic education, or with very little of it. There are people with so much natural intellectual vigor, good sense, and what may be called frugality of opportunities, that with little or no education, their minds become developed to an extent to which only the nurture of tutelage would mature those with fewer natural endowments. Such people are, though, the exception and not the rule. But as the *Atlantic Monthly* writer says, nature cannot be depended on to make a decently rational man out of "the average boy of good enough physical basis, of ordinary tendencies to lead a healthy animal life, of average inclination to defend himself and push his way in the world so far as material advantages go." He requires education to train him.

Once for all, then, it will be said, that it seems of the utmost importance that engineers should be educated so that they can get them knowledge "from the written page, and from self-controlled, persistent, laborious thought." Education develops the mind so as to enable a man to do this, and therein is its chief value.

But the technical schools are attempting to do much more than this. The course of instruction, in most of them, aims at supplying the would-be engineer with what Mr. Sill has aptly called "handy information," for use in the practice of his occupation. It is the knowledge of this kind, which is taught at technical schools, that it was asserted is not essential to success as an engineer. Its value, as an aid to "making money by honorable means," it is believed has been and is very much overestimated.

This statement is made with the knowledge that it is opposed to the convictions of a large number of people, and to the interests of others. The gospel of "getting on" is now so firmly believed in and the worship of

workshops so rapidly taking the place of other religion that technical education has in many minds assumed a kind of sacrosanct character.

Before venturing further into the field of denial, which is sure to be hotly contested, it will be prudent to define exactly what is asserted. It is not said that technical education has no value, although some of our correspondents have tried to make it appear as though that was one of the doctrines inculcated. As Professor Vose said, in the article reprinted in the *Railroad Gazette* of Dec. 20, "formerly the only education was that of actual experience. Now a large mass of experience has been digested, and general rules begin to appear." The number of things which are capable of being taught in a technical school is no doubt rapidly increasing, as general rules and practice are being formulated. Some of the sciences are daily having a more and more important bearing in the arts, and a knowledge of their principles, therefore may be very useful to an engineer. It is also true that, so rapid are the changes which are taking place in the arts and industries of the world, no one can tell how soon a knowledge of some science which is new to the special art which he is practicing may be required by fresh discoveries in the irresistible march of improvement.

At the annual meeting for the distribution of prizes and certificates in connection with the Institute for the Advance of Technical Education, in London, Dec. 14, 1882, Dr. Siemens is reported as saying that:

"It was not sufficient for after-life to be efficient in a craft or calling. Unless the workman also mastered entirely the scientific principles underlying that calling, he might, in consequence of some invention changing the *modus operandi* in an occupation, be left high and dry, whereas with a knowledge of fundamental principles, he could adapt himself to changed circumstances."

All this is true, and to those young men who are fortunate enough to be in a position which will enable them to spare the time and the money required, to "store their minds"—to use a well-worn phrase—with this kind of knowledge, we say by all means do not forego the opportunity.

But to go back again to the *Atlantic Monthly*, the author of the article from which we have already quoted so much, says: "If Aristotle and Bacon were to enter the company, we would hardly fail to recognize them as rather well-educated men, although their minds would be empty of all those facts of modern science that are asserted by Mr. Spencer to be the essential condition of any sound education." We will mention another illustration, selecting for the purpose men who are or were, our contemporaries. Supposing that Mr. Jervis, Mr. Welch and Mr. Latrobe could be taken to the line from the Grand Central Depot through the Fourth Avenue Tunnel in New York, and were shown the system of interlocking signals now in use there, probably not one of these gentlemen would have the least idea of the principles or practice of operating them. If then they were taken to the instruction car fitted with the automatic air brake appliances, probably none of them would be able to comprehend the way it worked, or understand the intricacies of the triple-valve, auxiliary reservoirs, etc. Yet each one of these gentlemen would be recognized as an educated railroad engineer, having the training and qualities of mind which would qualify him for taking charge of such a line, and their ignorance of the special appliances referred to would be only a slight disqualification for having the control of the line. The inference is obvious; it is not what a man knows, it is what he is that is the important element in education, what he is implies a certain potential activity with the power and the habit of abstract conception and reasoning.

It is quite natural for every man to assume that the way in which he acquired his training and knowledge and experience is the best way to get it. What he knows and is have resulted from traveling over a certain road. Probably he cannot conceive what can be learned and what experience gained by taking an entirely different journey. The engineer who has gone through a technical school is inclined to feel that no one can have the same ability as those who have taken the course of study there. Mankind in all places and ages have been given to resolutions declaring the world to be the possession of the saints and to resolving that "we are the saints." Some of the graduates of technical schools have not entirely escaped that temptation.

In this connection we cannot resist quoting the following remarks from the London *Spectator* on one of the tendencies of education:

"The bad effect—we believe the only 'bad effect'—of education is its inflating tendency, its tendency to turn the educated into a clique or caste who think of those who have no education as the Pharisees thought of the 'accursed' people who knew not the Law. Even a little education is most valuable, so long as its value is not overrated by him who possesses it, as it too often is. You will find that a boy who can just translate '*Cunis latral*' thinks himself, on that account, entitled to give himself airs with a boy who



learns only English. And yet the knowledge of a few Latin words, at all events while it goes no further, is absolutely without effect on the conduct of life; though the smallest excuse for giving one's self airs has a very injurious effect indeed on the conduct of life. It is the same with an elementary knowledge of history, geography, and even 'the use of the globes.' To know these things is some little good, so long as they are not overrated. But to know them, and yet so to mistake the importance of knowing them that it 'puffs up' a man's general demeanor, is a very doubtful benefit indeed—perhaps even a mischief. We believe that, on the whole, the effect of an average university education—we do not mean a thorough one, which is sure to bring with it a certain amount of humility, if not of directly enlarged sympathies—is to inspire men with a very dangerous scorn for ignorance, and antipathy to what are often quite falsely thought of as cries due to ignorance, though they may be really very different things, cries due to suffering and want."

Mr. Charles Markham, of the Stavelly Works, near Chesterfield, in a recent letter to the *London Times*, made the following observations, which there is little doubt the experience of other employers in this country would confirm.

"I have known a great number of educated young men, possessing excellent technical knowledge, utterly fail in their career of life from the want of practical knowledge, experience and industry, while others who have gained great practical knowledge by work and industry universally succeed."

The critics of the article of Nov. 10 have found fault with the remark in which success is spoken of as "making money by honorable means." It may be remembered that our assistance was asked in behalf of a young man who was "considering seriously how the next year may be employed to his best interest 'in the long run.'" This we interpreted to mean what is usually implied by worldly advantage. If advice was asked with reference to the general conduct of life, having in view eternity besides, a very different article from that on "The Education of Engineers" would have been written. At the time it was preferred to discuss the bald question to what extent is the education of technical schools essential or useful in aiding an engineer to make money by honorable means.

But this article must be ended. There is much in the letters of our correspondents to which it has been impossible to refer. It was intended to refer again to the fact that engineering is being so much specialized that it is impossible to teach all the different branches in any one school. It was hoped that there would be room to refer to the indignation manifested at the suggestion to give up, for the time, the term, "civil engineer." Some of our correspondents waxed wroth at this. There is a story told of one occurrence which took place in war-times, which illustrates the attitude which it may be well to assume with reference to this matter. A sentimental young woman, who visited a military hospital for the first time, approached a sick veteran and asked him in her sweetest tones whether he would not like her "to bathe his fevered brow." "You may," he said, "if it will do you any good, but you will be the sixteenth woman that has done it today." Far be it from us to deprive any one of the consolation of the term "civil engineer" if it "does him any good." As one writer said, probably as long as the world stands there will be work to be done of the kind which has been directed by those whom we have called civil engineers. All that was intended by the abandonment of the term was to evolve, by substitution, a value in the equation of the first article, which value was somewhat obscure.

In conclusion it will be repeated that the most essential thing in the scholastic education of an engineer seems to be mental development—the acquisition of the capacity for abstract conception and reasoning, and the ability to think and get the full benefit of other men's minds and experience from their written words. An education in a good school which is not technical will give this, so far as such training is essential to the success of an engineer. With such a training the needed special information will always be within reach. But if the aspirant is in a position to get a larger store of information and a more liberal education, so much the better; but it might be well if the advocates of technical education would follow the advice with which Mr. Markham's letter closed. He said "they should deeply impress on the minds of young men that the instruction will not tend to their successful career in life unless it is combined with great practical experience, sound judgment, and knowledge of work, without which their labor will be of no more value than that of their teachers would be in a modern workshop."

#### CHICAGO THROUGH SHIPMENTS EAST FOR FOUR YEARS.

The Chicago through shipments to the East as we have reported them from week to week during the month of December were, as noticed at the time, incomplete records of the total shipments, because for three weeks of the month there were more or less

shipments which were billed at the rates in force previous to Dec. 1, and these were not included in the weekly reports, which gave only what was carried under the tariff of Dec. 1. Not half the shipments in the first week of December were at the new rate, and altogether during the month 48,879 tons were carried at the old rates. Including these, the total Chicago shipments for the month of December for four successive years have been:

	1879.	1880.	1881.	1882.
Tons.....	179,154	244,790	259,326	280,151

Thus the shipments of the month in 1882 were 8 per cent. more than in 1881, 13½ per cent. more than in 1880, and 56 per cent. more than in 1879. Allowing for the lower rate on part of the shipments this year, the earnings from the shipments must have been about at the rate of \$253 in 1882, for every \$100 in 1881, \$264 in 1880 and \$221 in 1879. The rate was 40 cents per 100 lbs. to New York for flour and grain in 1879, 35 cents in 1880, various, but probably not averaging more than about 12½ cents in 1881, and 30 cents in 1882 (except that nearly 50,000 tons were billed at 25 cents.)

The shipments in December were larger than in any previous month since January, 1882, were equalled in no month of 1881, only in March in 1880, and in April and May in 1879. The only month of as large shipments at a time when rates were maintained was in March, 1880. There have been two or three other months when, owing to higher rates, the earnings from the shipments were a little larger; but it is still one of the best months the railroads have ever had. A few thousand tons were carried during the month by the new Nickel-Plate road, which is not in the pool.

The Chicago shipments for each month of the past four years have been:

	1879.	1880.	1881.	1882.
January.....	192,512	195,378	263,872	321,168
February.....	198,541	195,541	274,331	225,816
March.....	258,458	318,983	212,021	179,145
April.....	208,642	186,543	275,417	138,472
May.....	280,355	125,157	171,432	115,772
June.....	260,234	223,977	242,463	115,865
July.....	145,788	160,187	259,253	95,039
August.....	102,203	169,314	260,608	138,241
September.....	134,141	151,464	265,414	153,234
October.....	193,976	179,466	258,674	152,871
November.....	168,274	219,840	216,506	214,295
December.....	179,154	244,790	259,326	280,151

The last year, thus, was one of the greatest fluctuations. In it was the month of the largest shipments (January), and the month of the smallest (July). After rates were restored the shipments were much less than in 1881, first, because there was little to ship, and after June because the shipments were swelled in 1881 by the war rates. In spite of the latter, however, the December shipments, as we have seen, were larger in 1882 than in 1881. The railroad war having made 1881 an exceptional year, comparisons of 1882 with 1880 are more valuable. After the two months of war rates in 1882, we find that the shipments were every month less than in 1880 (when the rate was 5 cents higher) until after August, when the new crops began to be felt. In the four months after August the shipments were 799,922 tons in 1882, and 795,560 in 1880—nearly equal. In 1879 during the same four months the shipments were 675,545 tons, and the 999,920 tons carried in these months in 1881 produced in gross earnings probably at least one-third less than the smallest of the other three years, and in net earnings comparison is hardly possible, for in 1881 there probably were none from this traffic.

The rates prevailing during these years were as follows:

In 1879 cutting of rates began with January and rates were irregular until August. The following statement is approximately correct as to the changes during this period of railroad war, and quite so after it, the rates being those of the lowest class, including grain and flour: During January, 1879, 25 cents per 100 lbs.; during February, 20 cents; March, 18 cents; April, 15 cents; May 1 to June 9, 10 cents; June 9 to 22, 20 cents; June 22 to Aug. 4, 20 cents; Aug. 4 to Aug. 25, 25 cents; Aug. 25 to Oct. 13, 30 cents; Oct. 13 to Nov. 10, 35 cents; Nov. 10 to March 1, 1880, 40 cents; March 1 to April 13, 35 cents; April 13 to Nov. 27, 30 cents; Nov. 27 to Feb. 1, 1881, 35 cents; Feb. 1 to 28, 40 cents; March 1 to 31, 35 cents; April 1 to 11, 30 cents; April 12 to 17, 25 cents; April 18 to June 8, 30 cents; June 8 to 17, 25 cents—with considerable freight taken at less than these regular rates after February; June 18 till January 28, 1882, no regular rates, but generally 15 cents until August and lower rates afterward, presumed to average 12½ cents until January; in January the average was probably less, there being great quantities taken on contracts, some as low as 8 cents, and these contracts covered most of the shipments in February and some in March, though the regular rate was made 20 cents on Jan. 28, and advanced to 25 March

25, at which it remained until Dec. 1, when the present 30 cent. rate went into effect.

The shipments for the entire year have been:

	1879.	1880.	1881.	1882.
Tons.....	2,471,738	2,309,640	2,889,317	2,128,931

Thus the shipments were considerably less in 1882 than in any of the other three years—more than 25 per cent. less than in 1881, 8 per cent. less than in 1880, and 14 per cent. less than in 1879. Shipments were swelled in 1879 by the railroad war, which diverted shipments from the lakes, and still more so in 1881, and a little in the first two months of 1882; though as the lakes were not open the low rates then may not have added so much to the total rail shipments of the year, but rather caused the grain to go earlier rather than later by rail. In 1880 alone were rates maintained throughout. This was the year of the heaviest grain shipments ever made, the harvests of both 1879 and 1880 having been magnificent. We have seen, however, that in the last four months of 1882 the shipments were as large as in the corresponding four months of this most prosperous year 1880. There is no indication here, however, that this traffic is growing. The regular rates have been lower in the last year than were ever agreed upon before, and with the lower rates the traffic since August is equal to that of the best year. With two additional roads to carry the freight it was desirable that there should be some growth of the traffic. If we could go back of 1879 we doubtless should find a very large one, but this growth seems to have been arrested of late years. In fact, there has been a much greater decrease in the total shipments of Chicago than is shown by the rail shipments, because there has been a large falling off in the lake shipments. The lake shipments of grain, which were 101,777,647 bushels in 1880, fell to 57,379,591 in 1881. We have not the figures for 1882 for Chicago by itself, but the shipments from all lake ports then were but 65,354,475, and in 1881 the lake shipments from ports other than Chicago were 21,882,981 bushels. It is, therefore, safe to say that the Chicago lake shipments were several millions of bushels less in 1882 than in 1881. The lake shipments other than grain from Chicago are not very important.

Thus, though the railroad shipments last year were recruited from the lake business—the railroads carrying a much larger share of the grain than is usual—we find that the rail shipments were still the smallest since 1878 at least. And the statistics show that the total Chicago through shipments to the East have decreased since 1880 and 1879; most of the decrease has been suffered by the lake vessels; a smaller part by the railroads. With the better crops of last year, there is certain to be a considerable increase in the shipments of the current year over those of last year, as is sufficiently shown by the heavy movement recently. But whether there will be any more for the railroads to carry than in 1880 is extremely doubtful. The production of the country which markets its grain and stock at Chicago was certainly much greater last year than the year before, but it is estimated by the Agricultural Department to be just about the same as in 1880, and much less than in 1879. But from the same production there is now much less to ship, because of a large increase in population and greater requirements in the West itself. This may not give the railroads less to do on the whole, for it increases the west-bound shipments and the travel; but it materially lessens the Chicago shipments. Whether they are kept up during the coming year will depend largely on the extent of the lake competition. That was materially less last year than in any previous year, we believe; in no year when rates were maintained did the railroads get anything like so large a proportion of the grain shipments. The vessels seemed to abandon competition when the railroads were carrying grain from Chicago to New York at 25 cents per 100 lbs. It is questionable, however, if the railroads would have had the field so much to themselves if there had been large grain exports. Last year an extraordinarily large proportion of the grain was required for home consumption in the East, and for only a small part of this (principally than that going to canal towns) can the lake vessels compete successfully. This year there will be larger exports, and the vessels will be better able to compete for this part of the trade.

While the exportable surplus of the West for the last harvest is doubtless not as large as that from the harvest of 1880, there may be still more to go forward to the seaboard for exportation to foreign countries, because the South will probably require less from the West than in 1881, and very much less than in 1882, having produced more grain than ever before; and the demand in the East will be somewhat less than in 1881-82, because it too had a bad harvest in 1881, and about 20,000,000 bushels more in 1882. The effect of this latter, however, will not be so much a change in



the amount of western shipments as in their destination; what last year went to interior points in New York, Pennsylvania and New England, going through to the sea-board. But the reduction in the Southern demand will set more grain free for export.

We should not expect so heavy a movement from Chicago in the first two months of this year as in the corresponding months of last year, when the surplus grain that ordinarily would be carried forward until August was hurried forward all at once, partly because of a heavy demand at high prices, but more because of contracts to carry at less than half the ordinary rates. But the business of the first half of the year cannot fail to be much larger than last year, because there is very much more to carry. The exceptionally heavy movement in December and so far in January is hardly likely to continue, however. It was made heavy largely because of the pressing need for corn in the East as soon as it was fit to ship. This demand will probably not be so pressing hereafter (though there is as yet but a small stock accumulated), and unless there shall be exports on a large scale there may not be very large corn shipments during the rest of the season. The activity of the export demand will have much to do with the amount of shipments hereafter. In the only years when rates were maintained, the average weekly shipments from Jan. 1 to the opening of navigation were a trifle less than 50,000 tons in 1880 and 56,200 in 1881 (and in the latter year there was some cutting of rates which may have increased shipments a little). Average shipments of 50,000 tons a week from now until the opening of navigation ought to be quite satisfactory this winter. During the six weeks following the close of navigation the average, however, has been 68,672 tons. There may thus be a very large decrease and still leave the shipments large. It will be remarkable if for the rest of the time before the opening of navigation they are as large as they have been heretofore. What tends to keep them larger than usual is the small accumulated stock of corn in the East and the low rail rates, which prevent the holding of grain at lake ports till the opening of navigation to the same extent as when the winter rate was 35 cents (in 1880-81), or 40 cents (in 1879-80). On the other hand there is not so much either of provisions or of grain to ship as previous to 1882—much less provisions. A good foreign demand added to the large actual requirements of the East might keep up the winter movement, and make the total of it much larger than in 1880 or 1881, and possibly larger than in 1882, when for three of the five months that navigation was closed rates were not half as high as this winter. It will be to the advantage of the railroads to carry the grain now, as not only will the vessels get a large part of what is left to market after navigation opens, but the railroads will have to accept lower rates for what they do carry. So far they have had every reason to be satisfied with their winter business. For the 6½ weeks from the close of navigation to Jan. 14 the Chicago shipments have been:

Tons.....	1879-80.	1880-81.	1881-82.	1882-83.
	250,563	371,803	385,239	412,035

At the rates current in the several winters, for every \$1,000 earned from their shipments in 1879-80, \$1,297 was earned in 1880-81, about \$480 in 1881-82, and \$1,231 this winter—the increase of 10.8 per cent. in traffic over 1880-81 not quite making up for the decrease 14.3 per cent. in the rate.

In the above the amount carried from Chicago by the New York, Chicago & St. Louis road this winter is not included; it amounts to several thousand tons, but is but a very small percentage of the total. Before the opening of navigation this road will doubtless be in position to take a larger share of the Chicago business. By that time, too, the new Chicago & Atlantic road will be in the field. If then the total shipments are not larger than heretofore (and for the whole crop year, ending say with July, we can hardly expect them to be), then the amounts carried by the other roads after they are opened must be less than heretofore. These roads, however, are not likely to have much effect on the winter business.

#### PROGRESS OF THE NEW YORK, LAKE ERIE & WESTERN.

The New York, Lake Erie & Western Company was for many years the least progressive of the trunk lines. Unable to earn the interest on its bonds, it was without credit, did not keep up its road to the standard of other trunk lines, preserved its old exceptional gauge at a time when close connections with roads west had become indispensable, suffered from an inadequate equipment and especially from very imperfect motive power. Yet during the period of reorganization it was seriously questioned by some of the English stockholders, or by persons who assumed to instruct them, that the road did not require more cap-

ital; that an expenditure of additional capital would not enable it to get more traffic or carry it at less cost.

That the traffic of the road was exceptionally unprogressive may be seen by comparing it with that of the trunk lines on each side of it in 1873 and 1877, as follows:

Year.	Passenger miles.			Ton-miles.		
	N. Y. Cen.	Penna.	Erie.	N. Y. Cen.	Penna.	Erie.
1873.....	319	174	156	1,021	1,190	951
1877.....	359	190	155	1,404	1,479	1,017
1876.....	353	288	163	1,074	1,630	1,040
1877.....	317	143	171	1,620	1,495	1,115
1878.....	300	142	140	2,042	1,732	1,225

In passenger traffic there was no growth on any of the roads; and the differences in the decrease on the different lines do not call for remark. But this was a period of growing freight traffic. From 1872 to 1876 and to 1878, the amount and percentage of increase on each line was:

	—To 1876—		—To 1878—	
	Amount.	P. c.	Amount.	P. c.
New York Central.....	653	64	1,021	100
Pennsylvania.....	440	37	542	46
Erie.....	89	9	274	29

The Erie's gain in freight traffic from 1872 to 1876 was thus less than a seventh of the New York Central's gain, and but a fifth of the Pennsylvania's. It first began to gain in 1877 (when the other roads lost) and from 1876 to 1878 it gained 185,000,000 of ton-miles, against the Central's 368 and the Pennsylvania's 102. Now, let us see the progress made of late years:

Year.	Passenger miles.			Ton-miles.		
	N. Y. Cen.	Penna.	Erie.	N. Y. Cen.	Penna.	Erie.
1879.....	291	176	149	2,206	2,137	1,569
1880.....	331	197	180	2,525	2,298	1,721
1881.....	374	241	200	2,647	2,655	1,984
1882.....	432	...	225	2,395	...	1,954

This has been a period of growth in passenger as well as freight traffic, and the increase (in millions of passenger and ton miles) and the percentage of increase since 1878 have been:

	—Passenger miles—		—Ton-miles—	
	Amount.	P. c.	Amount.	P. c.
N. Y. Cen.....	132	44	353	17
Erie.....	85	61	729	59
Penna. (to 1881).....	89	63	923	53

Here we find a change. The railroad which had no growth of freight traffic from 1873 to 1876, when the other roads had a large increase, having been put into shape to do business found business to do, and the proportion of its increase in passengers from 1878 to 1882 was considerably larger than the New York Central's, and in freight traffic the amount of increase was actually *twice as great* as the Central's, though less than the Pennsylvania's, while the *percentage* of its increase was much greater than on either of its neighbors.

It may suggest itself to the reader that this last period was one of extraordinary activity in the coal and iron industries; that the Pennsylvania and the Erie have immense traffic from these industries, the Central comparatively a small one. Part, then, of the Erie's greater growth of traffic has been due to this fact. Fortunately it reports separately the ton miles of coal. There were 267 millions in 1878 and 611 in 1882, so that 344 of the 729 millions of gain was due to this special traffic, which may be said to be out of the reach of the Central.

While the Central suffered a decrease of 252 millions of ton-miles from 1881 to 1882, the Erie lost but 30 millions; but here again the coal traffic had its effect, for it increased 36½ millions on the Erie, while the New York Central had a smaller coal traffic. This, however, still leaves much the larger loss in other freight on the New York Central. The gain in passenger traffic from 1881 to 1882 was 15 per cent. on the Central and 12½ on the Erie.

It is thus sufficiently evident that there *was* reason for preparing the Erie to do a larger business. When prepared, it not only shared the growth of traffic with the other trunk lines, but it seems to have had a growth peculiar to itself, as if resources which had failed to develop when the road offered limited facilities had been making up for lost time since.

Now as to the economical conduct of its business: We discussed two weeks ago the working expenses of the New York Central and the Erie last year, and showed that there are such differences in the book-keeping that we cannot fairly compare expenses per train mile, or per ton or passenger per mile of the two roads. But in what follows it is not the comparison of the roads with each other, but of each road with itself in different years, that is important. Each road, presumably, has charged its expenses in the same way every year, and it is the *progress* of these expenses which we need to trace. Now the receipts and expenses per ton and per passenger per mile in several years on this road and the New York Central have been,

Year.	—Per pass. mile.—			—Per ton mile.—		
	N. Y. C.	Erie.	Cost.	N. Y. C.	Erie.	Cost.
1873.....	2.06	1.42	2.218	1.57	1.02	1.454
1877.....	2.07	1.14	1.885	1.471	0.99	0.955
1878.....	2.00	1.27	2.199	1.693	0.93	0.973
1879.....	2.05	1.20	2.091	1.594	0.78	0.780
1880.....	1.99	1.26	2.041	1.361	0.87	0.836
1881.....	1.86	1.20	2.016	1.372	0.78	0.805
1882.....	1.80	1.15	1.947	1.245	0.73	0.749

The reported cost per passenger-mile decreased much

more on the Erie than on the Central from 1873 to 1877; but the division of expenses in 1873 was made so as to show exaggerated passenger expenses. The decrease has been much greater (27 per cent.) on the Erie from 1878 to 1882 than on the Central (10 per cent.). Per ton per mile, the Erie's expense decreased 0.181 cent (19 per cent.) from 1873 to 1877, while the Central's decreased 0.330 cent (32 per cent.). From 1877 to 1882 the decrease was 13 per cent. on the Central and 30 per cent. on the Erie. The Central was provided with all that its managers required for economical working before 1878; the Erie lacked almost everything. The improvement of the road is chiefly seen in the material reduction in the expense per ton per mile. How great this has been and how indispensable to its success in competing for traffic, may be judged by the fact that if its decrease in expenses from 1877 to 1882 had been no greater than the New York Central's, its profits from freight in the latter year would have been about \$2,650,000 less than they actually were, and the total profits would not have been sufficient to meet all the fixed charges. And if the cost per passenger mile had not been reduced more than the Central, its profits from passengers would have been \$730,000 less the same year. To get down the expenses about as low as on other trunk lines was a necessity of the continued existence of the road. This has been effected, or nearly so, and it has saved the road from another bankruptcy, without any doubt. The reported profit per passenger mile last year on the Erie was a little larger, and per ton-mile was 70 per cent. larger on the Erie than on the Central.

The course of the earnings and expenses of the two roads has been:

Year.	—Gross earnings—		—Expenses—	
	N. Y. Cen.	Erie.	N. Y. Cen.	Erie.
1873.....	\$29,126,851	\$20,012,606	\$17,641,988	\$13,640,642
1877.....	26,579,085	14,708,890	14,946,162	10,809,840
1879.....	28,396,884	15,942,023	16,123,073	11,174,989
1880.....	33,175,913	18,693,109	17,849,894	11,643,925
1881.....	32,348,397	20,715,605	19,464,787	13,256,230
1882.....	30,628,781	19,975,774	19,395,974	13,088,094

In gross earnings the two roads were \$9,000,000 apart in 1873, \$11,900,000 in 1877, \$14,500,000 in 1880, and \$10,650,000 in 1882. In expenses the Central exceeded the Erie but \$4,000,000 in 1873 and little more in 1877; but by \$6,200,000 in 1880 and 1881, and by \$6,300,000 in 1882.

The net earnings meanwhile were:

Year.	—Net earnings—	
	N. Y. Cen.	Erie.
1873.....	\$11,484,864	\$6,371,964
1877.....	11,632,924	3,809,050
1879.....	12,273,811	4,767,324
1880.....	15,326,019	7,049,183
1881.....	12,883,610	7,459,375
1882.....	11,232,807	6,887,680

The Central's net earnings were 27 per cent., the Erie's 2½ per cent. less last year than in 1880, and the decrease from 1881 was 7½ per cent. on the Erie and 13 per cent. on the Central.

#### Erie Earnings and Expenses.

The New York, Lake Erie & Western is again making monthly reports of earnings and expenses, which are a substantial addition to our means of understanding not only the business of this one road, but the general condition of railroad business and of other business also, in the country as a whole. With the monthly reports of the Pennsylvania, now extending over a period of ten years, and the Erie's, we may infer the general condition of trunk line business; though as important as either, perhaps, and perhaps more so, are the earnings of the New York Central. It being comparatively unaffected by the fluctuating coal and iron traffic, which so largely adds to the earnings of the other two roads named, and having a larger share of the through traffic than either, its business reflects more accurately the general condition of business and of manufacturing other than iron. The three together are needed to give us data for a safe judgment. The Pennsylvania, as we have seen recently, has special local resources which may neutralize at times the gains or losses from the traffic which is common to all the trunk lines. We have until recently had reports from no other trunk line. If we had depended upon it as indicating the course of the earnings on the other trunk lines during the year ending with September last, we should have been grossly misled. In those twelve months it gained \$3,248,000 (7½ per cent.) in earnings, while the New York Central lost \$1,720,000 (5½ per cent.), the Erie \$740,000 (3½ per cent.), and the Baltimore & Ohio \$80,000. Those who are familiar with the nature of the traffic of the different roads knew that the Pennsylvania's gains in this year must be exceptional, but not many make the requisite allowance for the difference in the roads. The reports of the Erie will especially illustrate the condition of New York business better than those of the Pennsylvania, as it both carries from and to that city much more freight.

So far the Erie has reported for the months of October and November since the close of its last fiscal year.

In neither of these months does it show anything like the increase in earnings reported by the Pennsylvania, or, informally, by the New York Central. It should be said, however, that its earnings did not decrease so largely in these months in 1881 as did the Central's. Its gross earnings in October for the last six years have been:

Year.	1877	1878	1879	1880	1881	1882
Gross earnings.....	\$1,535,343	\$1,473,532	\$1,713,987	\$1,809,010	\$1,814,868	\$1,819,010

Thus though the earnings were but little more than in 1881



and \$80,900 less than 1880, they were larger than in any previous October. The October earnings in 1880 were extraordinary—larger than in any other month in the history of the road—and the October earnings in 1883 have been exceeded only then and in March of 1880, when they were \$1,847,261.

The expenses last October were a trifle less than in October, 1881, when they were exceptionally large; and the net earnings in October for six years have been:

1877.	1878.	1879.	1880.	1881.	1882.
\$604,553	\$619,487	\$715,722	\$889,504	\$625,678	\$643,329

Last October the net earnings were 3 per cent. more than in 1881, 27 per cent. less than in 1880, and 10 per cent. less than in 1879.

The gross and net earnings and expenses in November for the six years have been:

	Gross earnings.	Expenses.	Net earn.
1877.	\$1,570,943	\$962,589	\$608,354
1878.	1,381,391	863,310	518,081
1879.	1,515,834	957,937	558,197
1880.	1,797,337	1,051,733	745,604
1881.	1,715,469	1,075,887	639,582
1882.	1,818,824	1,061,618	757,206

Here we find the gross earnings 5½ per cent. more in 1882 than in 1881, and larger than in any previous November. There was a slight decrease in the working expenses (which, however, have been remarkably uniform for the past three years), and the net earnings were 18½ per cent. more than in 1881, 1.6 per cent. more than in 1880, and 35½ per cent. more than in 1879.

For the first two months of the company's fiscal year the gross earnings have been:

1877.	1878.	1879.	1880.	1881.	1882.
\$3,106,286	\$2,854,923	\$3,229,531	\$3,697,247	\$3,530,335	\$3,637,834

Meanwhile the working expenses were:

1877.	1878.	1879.	1880.	1881.	1882.
\$1,893,379	\$1,717,355	\$1,955,612	\$2,065,139	\$2,265,075	\$2,237,299

And the net earnings were:

1877.	1878.	1879.	1880.	1881.	1882.
\$1,212,907	\$1,137,568	\$1,273,919	\$1,632,108	\$1,265,260	\$1,400,535

The gross and net earnings have been larger only in 1880, when the gross earnings were but \$59,412, but the net earnings were \$231,573 more than last year. In these two months the Pennsylvania's gross earnings were \$1,587,000 (21 per cent.), and its net earnings \$558,000 (18 per cent.) larger than in 1880.

#### Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

*Ohio Central.*—Extended from Pt. Pleasant, southeast to Charleston, W. Va., 57 miles.

*Weston & Buckhannon.*—Track laid from Weston, W. Va., eastward 2 miles gauge 3 ft.

This is a total of 59 miles, making 10,524 miles so far reported for 1882.

New track is reported laid in the present year as follows:

*Eureka Springs.*—Extended from White River east by south to Eureka Springs, Ark., 7 miles.

*Indiana, Illinois & Iowa.*—Extended eastward to Sugar Creek, Ind., 6 miles.

This is a total of 13 miles, making 36½ miles thus far reported for 1883, against 39 miles reported at the corresponding time in 1882, and 47 miles in 1881.

THE NEW YORK STATE RAILROAD REPORT for the year ending Sept. 30, 1881, reached us last Monday, Jan. 22, nearly sixteen months after the close of the year reported upon, and just after the report of the Massachusetts Railroad Commission for the following year had been made public. The state has required an elaborate report from the railroad companies and publishes it at considerable expense, on the theory that the public needs the information, and we fully approve of this; but then it permits the document which has cost it and others so much to lie in the printers' hands until it has lost nearly all practical value. And it must be confessed that the patience with which this delay is endured indicates that, whatever the value of the report, there is no public demand for it. The *Railroad Gazette* alone, so far as we have heard, has missed the report, and usually it alone of the press of the state makes any notice of it or any use of its contents. It is hardly to be expected, however, that a newspaper should have much use for information 16 months old. Here for more than a year we have had to base our charges of extortion on the average freight rate of 0.92 cent per ton per mile reported in 1879-80, and all the time it seems that the rate had been reduced to 0.84 cent. Must we now wait another year before we shall know whether the monopolies further mended their ways in 1881-82, or again riveted the chains on the state's industries? We can say now that the net earnings of the New York railroads were 4.34 per cent. on their stock and debts in 1879, 5.1 in 1880, and 4.4 per cent. in 1881; must we wait another year before we shall know how extortionate was the profit last year? This, we submit, gives an unfair advantage to the railroads. When we chide them for their impositions and prepare to relieve ourselves of them in the future, they can always say, "O yes, we were able to make something handsome in our early days, but in modern times we can do little more than make both ends meet," and none of us can say them nay. Does not this look as if the railroads were in conspiracy with the State Printer, or whatever authority determines when legislative documents shall be printed, to conceal the evidence of their crimes? It is all very well to say that it is all made public. We want our

evidence in time to hang our man, and not after he has died a natural death.

But now, after waiting so long for the report, we find it is but part of a report. The law required the steam railroads to hand in their reports by Dec. 30, 1881, when State Engineer Horatio Seymour, Jr., had just 11 days of his term of office left, including two Sundays, after which he was succeeded by Silas Seymour. When Dec. 20 came the trifle of eighty-two companies had failed to report, and the totals in his report of the aggregates of all the railroads of the state were therefore somewhat inaccurate. It seems that it was not thought worth while to complete this necessarily imperfect statement made by the late State Engineer, or to supplement it by a complete one. Possibly the copy was hurried off to the printer to enable him to get it out twelve months afterward.

The retiring State Engineer, in this report, says that the printer greatly delayed the report for 1880, which was submitted to the Legislature April 1, and received from the printer Oct. 31. With any reasonable office force the report should be ready for the printer long before April, and in print shortly afterward. More than half the space taken up by the reports could be saved by tabulating them, and, with some notes and references, they would thus be more, and not less intelligible, than as now presented.

The railroad report hereafter is to be made by the Railroad Commission. It should be able to check the reports as they come in, have doubtful statements explained, blundering ones corrected and guesses eliminated, and still get the report ready for publication, so that it may be in print and before the Legislature, not later than the 1st of February or thereabouts. But if it cannot get its report printed until the facts which it records are a year old or more, then it might about as well not make any report—might about as well not exist, in fact.

THE VANDALIA LINE, by which the Pennsylvania Company reaches St. Louis, is almost an air line across Illinois, and the first link in the shortest route between St. Louis and the East. It passes through an extremely fertile and well-peopled country, is all main line, and ought to be, it would seem, one of the most profitable of Western railroads. Actually its gross earnings during the year ending with October last were \$10,102 per mile—a moderate sum for a trunk line—and its net earnings only \$2,586 per mile. The expenses, it will be seen, are an unusually large part of the earnings. Most Western roads with such gross earnings would have \$3,500 to \$4,500 net per mile. The cause of this, however, is not high cost of working, but low rates. Last year the average rates were 0.877 cent per ton per mile and 2.353 cents per passenger per mile. These will do very well for a trunk line with an immense traffic, but they are starvation wages for a Western road. The traffic is quite large, and it grows, but the road does little more than earn the interest on its bonds, and sometimes it does not do that—it did not in 1881 and also in 1879. The road is eased and the interest is advanced by the lessee when the road does not earn it. The interest charge is not heavy—only \$2,000 per mile. A very large share of the freight traffic of the road is through, which must always be carried at low rates; but the local traffic would probably support the road handsomely were it not that the rates on a large part of this are greatly affected by the through rates. Last year the average rate on through freight over this road was but 0.609 cent, against 0.669 cent the year before. The average expense per ton per mile for all freight could not have been less than 0.660 cent.

Compared with the previous year there was an increase of 8.3 per cent. in freight traffic and a decrease of 4½ per cent. in passenger traffic. Ton-miles and passenger-miles for four successive years have been:

	1879.	1880.	1881.	1882.
Ton-miles.....	86,424,189	96,544,226	107,089,535	115,982,845
Pass.-miles.....	12,974,971	17,309,910	18,161,449	18,311,812

The increase since 1879 has been 31 per cent. in freight and no less than 41 per cent. in passenger traffic. Freight earnings, however, meanwhile increased but 26 per cent. and the passenger earnings but 29 per cent.

With several parallel and competing railroads, and the competition of lines running northward to Chicago and southward to the Gulf, this road, like other roads crossing Illinois from east to west, it must always accept very low rates. Could it obtain as much as some of the roads further north, it would earn large dividends. The freight rate of the Chicago & Alton in 1881 would have added \$430,000 to its profits, which would have paid nearly 11 per cent. on the stock (but the Alton's passenger rate that year would have reduced its profits \$96,000). And the Rock Island's rates would have had nearly the same effect. All that keeps some of these roads south of Chicago from paying dividends like the Chicago roads is the inability to get as good rates—an inability which is the result of their situation, compelled for a large part of their traffic to accept trunk-line rates and suffer from trunk-line wars, while with the great local as well as through traffic which enables the trunk lines to make very large aggregate profits from very low rates.

THE NUMBERS OF IMMIGRANTS during the year 1882, and the two preceding years, are reported by the Bureau of Statistics to have been as follows:

	1880.	1881.	1882.
No. of immigrants.....	583,068	710,808	712,542

There is thus a small decrease from 1881, when the number was 22 per cent. more than the year before and much more than in any earlier year. The decrease for the whole of last year would be of no particular significance, but the decrease in the last half of the year is decided, and indicates

a considerable slackening of the current. The numbers arriving in each half of the last two years have been:

	1882.	1881.	Inc. or Dec.	P. c.
First half.....	442,063	388,511	Inc. 53,552	13.8
Second half.....	270,479	322,357	Dec. 51,878	17.6

Year..... 712,542 710,808 Dec. 4,328 0.6  
Thus we see that while in 1881 the arrivals in the last half of the year were but 40,000 less than in the first half, this year they were 172,000 less. There has been a sudden change from the unexampled immigration in the first half of the year to the comparatively moderate arrivals in the last half, which indicates either less attraction here, in the demand for labor at high wages, or more attraction at home; or perhaps the number of those desiring to emigrate has been so reduced by the great movement of the past four years that the number arriving is reduced on that account.

The addition to our population by immigration in 1882 was about 1½ per cent. Allowing 2 per cent. natural increase yearly, the arrivals since the Census was taken in June, 1880, make the population of the United States, Jan. 1, 1883, about 51,400,000—nearly 9 per cent. in 2½ years.

The arrivals in December show a continuance of the decrease which began some months before, there being but 25,868 in 1882 against 37,037 in 1881. December is one of the months of least immigration, and we may not safely judge from the arrivals then what they will be during the coming season. The movement is not light, by any means; it is positively heavy; only so much lighter than the previous year as to indicate that the rapidity of the current setting in this direction has been checked.

Of the total arrivals in 1882, no less than 66.4 per cent. was at New York; 8.5 per cent. at Port Huron (Grand Trunk crossing); 7.4 per cent. at Boston; 5.1 per cent. at Baltimore; 4.7 per cent. at Philadelphia; 4 at San Francisco; and 2.9 per cent. at Detroit. The arrivals at Port Huron and Detroit are partly Canadians, but chiefly, probably, the immigrants which arrived from Europe at Montreal.

CHICAGO THROUGH RAIL SHIPMENTS EASTWARD for the week ending Jan. 14 have been as follows, for the past four years:

	1880.	1881.	1882.	1883.
Tons.....	40,238	59,587	70,721	66,034

The shipments this year were thus 6½ per cent. less than last year, 10½ per cent. more than in 1881, and 64 per cent. more than in 1880.

The shipments billed at Chicago alone for the week ending Jan. 13 (which includes exactly the same working days as the week ending Jan. 14) were reported to be 67,544 tons. There is some unexplained difference here: the total shipments average about three-eighths more than the shipments which originate at Chicago.

The Chicago shipments in the first three weeks of December were much greater than were reported from week to week, because the shipments at the rates in force previous to December were not included, and these amounted to 48,579 tons. The average weekly shipments in December were actually 63,259 tons; actual shipments in the first week of January were 65,900, and in the second week 66,034 tons.

Of the total shipments in the second week of January the Chicago & Grand Trunk carried 12.5 per cent., the Michigan Central, 29, the Lake Shore 21.2, the Port Wayne 17.9, the Pan-handle 10.3, and the Baltimore & Ohio 9.1 per cent. Thus the two Vanderbilt roads together carried 50.2 per cent. of the whole, against 45½ in the pool, and the two Pennsylvania roads carried 28.2 per cent., against 35½ in the pool. The Vanderbilt roads are still short and the Pennsylvania roads over their shares since March 13, when the present apportionment went into effect, but they are now rapidly reducing their balances. The shipments of the Michigan Central are now extraordinarily large.

For the week ending Jan. 20 the shipments billed at Chicago (not including those from points west billed through Chicago) are reported as 50,922 tons this year, against 60,753 tons in the corresponding week of last year, and 67,544 tons in the previous week of this year (which must be a mistake.) Compared with the previous year there was a decrease of 2,374 tons in provisions and of 9,085 tons of grain, but an increase of 1,725 tons of flour. Though this shows a large falling off from the previous week, the shipments are still very large—equalled in but few weeks in the history of the business.

PROVISION EXPORTS were nearly equal in value last December and not very much less in quantity than in 1881, having been much less in earlier months. But this is because the exports in 1881 had already become very small in December. The total value for three years has been, in the month of December:

	1880.	1881.	1882.
Provision exports.....	\$15,007,069	\$12,987,225	\$12,071,422

Thus the decrease from 1881 was only 7½ per cent., but from 1880 it was 24 per cent.

The exports of hog products (bacon, ham, shoulders, pork and lard) for five successive years have been, in pounds:

1,131,109,904	1,186,683,721	1,322,908,092	1,012,366,788	641,411,726
---------------	---------------	---------------	---------------	-------------

nd It seems, then, that the exports last year were not half as

It seems, then, that the exports last year were not half as great as in 1880 and were 36 per cent. less than in 1881. Exports first reached a thousand millions of pounds in 1878. For the fiscal year ending with June 30 the exports exceed those of the calendar year 1882 in 1876-77 and 1878-79. The decrease is greater and more sudden than the increase after 1877. The bad corn crop of 1881 might account for the decrease in 1882, but not for that of 1881, which was almost as great. Restrictions on imports of American pork in France and Germany had less to do with it than might be



supposed; as we know from the fact there has been no over-supply at home.

The average value per pound of the exports in the last three years has been, in cents:

	Bacon and ham.	Pork.	Lard.
1880.....	7½	7	8
1881.....	9	8½	10½
1882.....	10½	9½	11½

The exports have fallen off partly because of reduced production, but more because the greater home demand has raised the price. The natural result should be a great stimulation of production, but the short corn crop of 1881 has prevented that so far. We may expect it to begin with the present year, however, and it will very likely be felt in the number of hogs packed in the "summer packing season," from March 1 to Oct. 31. It will hardly be possible, however, to replenish the stock of hogs enough to produce as much as in 1880 for a year or so to come.

THE BREADSTUFFS EXPORTS for December, the half year then ending, and the whole calendar year 1882, are reported by the Bureau of Statistics to have been, for the whole United States in bushels:

	1882.	1881.	Inc. or Dec.	P. c.
December:				
Flour and wheat.	12,861,854	10,208,937	Inc.	2,652,917 26.0
Corn.....	2,430,886	2,330,629	Inc.	100,257 4.3
All grain, value..	\$17,086,041	\$13,806,400	Inc.	\$3,279,641 23.8
Half-year:				
Flour and wheat.	96,107,304	72,758,102	Inc.	23,349,202 32.1
Corn.....	5,716,853	5,674,868	Inc.	41,985 83.0
All grain, value..	\$117,826,493	\$112,143,915	Inc.	\$5,682,578 5.1
Year:				
Flour and wheat.	141,971,507	148,426,053	Dec.	6,454,546 4.4
Corn.....	16,343,834	14,090,941	Dec.	2,252,893 16.0
All grain, value..	\$182,682,734	\$224,124,832	Dec.	\$41,442,098 18.5

The wheat and flour exports in December, though 26 per cent. more than last year, were not large, and much below the average in previous months since harvest. The corn exports were a little larger than last year, and though not large, were much larger than for many months before, and only about a fourth less than the exports for the previous five months. The value of the total breadstuffs exports were 23½ per cent. more than in 1881.

For the half year there is an increase of 32 per cent. in wheat and flour, but a decrease of 83 per cent. in corn, but the difference in prices was such that there was an increase of 5 per cent. in the total value of breadstuffs exported.

For the year the decrease in wheat and flour is not great, but in corn it is enormous, amounting to 74 million bushels, and to 78 per cent. of the exports in 1881. In all breadstuffs there was a decrease of 28½ per cent. in the bushels, but, of only 18½ per cent. in the value exported.

The percentage of the total value of Atlantic breadstuffs exports going from each port was:

	New York.	Boston.	Phila.	Baltimore.	New Orleans
1882....	50.0	7.1	4.8	13.4	4.0
1881....	56.0	6.7	6.7	15.7	4.4

New York and Boston together exported 66.1 per cent. of the whole in 1882, against 62.7 in 1881; Philadelphia and Baltimore together 18.2 in 1882, against 22.4 in 1881.

In 1882, San Francisco exported more in value than any other port except New York, and San Francisco and Portland, Or., together exported 23½ per cent. of the total from the United States.

A RAILROAD COMMISSION IN INDIANA is proposed, that state being without a Commission or any State reports, though all the other states west of Pennsylvania as far as Kansas and Nebraska have commissions. So far as reports are concerned, however, most of the Indiana roads have to report in adjoining states, as there are very few railroads exclusively in Indiana, and, by the way, not many with headquarters in Indiana. Great numbers of roads cross it but it is peculiarly a "transit" state. The Indianapolis Journal has interviewed the leading railroad men of that city, and found that, with but two exceptions, they do not oppose a railroad commission, or the railroad commission proposed in the bill introduced into the Legislature, and that some of them favor it. We believe that a majority of the railroad managers of the country favor commissions with authority like that of the Massachusetts and the Michigan, Iowa and some other commissions. It has become evident to most of them that the railroads are likely to suffer from grossly unjust legislation so long as there is no well informed public authority, representing the public, which will be able to see the injustice of such measures and advise against them. The railroad men may prefer to be wholly without restrictions, but they prefer to be subject to constant investigation and criticism by a body of men who will have an opportunity to learn something as to the necessities of railroad business rather than suffer under oppressive laws which destroy their profits and injure the public at once, such as the average legislature is very likely to pass. An intelligent railroad commission, by its investigations and reports, will prevent the larger part of the unmerited public condemnation under which railroads suffer. Even if we grant that the railroad managers would like best to keep up unjust practices from which the community suffers and they profit, yet it is easy to understand that they will prefer to give up these to a policy which will prohibit these and also other just practices from which the community as well as themselves profit.

EXCESS BAGGAGE—baggage in excess of the amount that is carried for the passenger without charge—has been the subject of much discussion and some new regulations in the West recently. The roads have been led to adopt strict rules about baggage charges and the weight allowed, because of the enormous trunks of commercial travelers, a few of whom, it is said, carry goods for delivery as well as

samples. With several of the last mentioned class of drummers on a train, little room was left in the baggage car for baggage of other passengers. It is expected that quite as much revenue will be received from baggage which will now be shipped as freight, as directly from the excess baggage rates. It is probable, however, that the new rules will cut down the size and number of trunks carried by drummers.

THE INTERNATIONAL SLEEPING CAR COMPANY, whose headquarters are in Brussels, we believe, and which uses cars introduced by Colonel Mann, an American, proposes to introduce between the chief European cities "lightning trains," to be composed of its sleeping and restaurant cars, to run at or near the maximum speed of Continental trains. No stops are to be made at any stations except to change engines. It is proposed to put on such trains on the route from London to Paris, from Paris to Brussels and Berlin and Vienna, from Berlin to Warsaw and St. Petersburg. And there is talk of such trains to Italy, to Constantinople, and to other European cities. Apparently the sleeping car company purposes to establish these trains at its own risk, paying the railroads for hauling them. It would seem a very difficult plan to carry through.

#### The Organization of the Lake Shore & Michigan Southern Railway Company.

The organization of the numerous roads which were united in the Lake Shore & Michigan Southern Railway was apparently simple, and, so far as we are aware, never definitely formulated. The Superintendent was apparently in many cases the manager of the line, as to all its affairs excepting finances. The Chief Engineer and Master Mechanic were responsible to him, and in one sense the transportation and maintenance of way departments were separate, or united only under the Superintendent; nevertheless, doubtless, there was a distribution of duty by circumstances rather than by any formal method.

On several roads, however, and among these the Lake Shore, the Chief Engineer was an independent officer responsible to the President, this arrangement growing out of circumstances connected with the experience of the officers filling these positions. When, however, the Lake Shore & Michigan Southern Railway organization was made, past facts undoubtedly had an influence, but the consolidated road started as a new and untrammelled organization.

On the death of the first President and the election of the second, resident at New York and taxed with many responsibilities, a resident Managing Director was appointed to relieve and assist the President. In 1875, the present General Manager was appointed and the organization of the road perfected.

Terms used in railroad organizations may easily mislead, since the same titles cover a great variety of duties and a limited or extended authority; in this case it is plain that the General Manager, replacing the Managing Director, has larger duties and responsibilities than fall to the office in other organizations. The General Manager is the head of all operating departments excepting the Auditor's, and has charge of all affairs excepting finances.

His staff consists of an Assistant General Manager, a General Superintendent, a General Freight Agent, two Assistant General Freight Agents, a General Passenger Agent, a General Ticket Agent, a Chief Engineer and a Purchasing Agent. The head of the Transportation Department is the General Superintendent, who appoints all subordinates except his own staff.

The staff of the General Superintendent, to carry out the military idea, consists of the General Master Mechanic, the General Master Car-Builder and the division superintendents.

The division superintendents have charge of the running of trains, control over engine-men and firemen while on the road, over trainmen, over station agents so far as discipline and order are concerned, and have oversight over the orderly conduct of shops and officers on their respective divisions.

The General Master Mechanic is the head of the machinery department, division master mechanics reporting to him. Each division master mechanic has charge of the shops and round-houses on his division, and to him engine-men and firemen report through the foremen of the round-houses. The machinery department is entirely separate from the transportation department; but in case of an emergency, as a wreck on the track, the Division Superintendent becomes the controlling officer. The firemen and engine-men are under the machinery department, except that they are subject to the orders of the Division Superintendent while running trains and when not within the round-house yard.

The General Master Car-Builder reports to the General Superintendent. He has charge of the car shops of the company and to him the master car-builders report. On occasion, however, both the General Master Car-Builder and the General Master Mechanic may be required to report directly to the General Manager.

The Chief Engineer, as we have said, reports directly to the General Manager; he has charge not only of construction and of matters connected with real estate, but is also the head of the maintenance of way department. Under him are the division engineers, who have charge of road on the various divisions and to whom the section-men report.

The separation of the road into divisions for each department agrees in general, but not in all details of territory, since branches form a disturbing element.

The Auditor is at the head of the accounting department, having charge of the various forms of account.

The General Freight Agent and General Passenger Agent

are responsible to the General Manager. There are two assistant general freight agents responsible to the General Freight Agent.

The station agents and local freight agents receive their orders as to rates from the General Freight Agent; and these orders are enforced through the supervision of the accounting room.

It will be observed that the road is organized by departments, each department being separate and distinct from others and finding its own head in a general officer of department. This form of organization, necessarily, requires a definite division of duties between departments; and this is effected by the constant presence of the General Manager to decide all questions of duty and jurisdiction.

Such a form of organization is at once simple and effective in proportion to the experience and ability of the General Manager, who must be competent to judge in all cases brought before him by the various departments. Moreover, such a form of organization gives opportunity for a direct control by one mind, relieved as to details of operation by heads of departments. Each form of organization, by its very principles, produces results which are apparent to a close observer; and this one shows plainly the influence of a leading mind controlling the road to definite business purposes. Its leading idea is effectiveness by the most direct methods, not only in traffic movements, but in all the affairs of the road. We may be mistaken, but it would seem that this had something to do with the fact that the shops of the road are devoted entirely to keeping its motive power and cars in running order. The organization is one for the conduct of the business of transportation purely, and by the most direct and immediately effective methods to results.

## General Railroad News.

### MEETINGS AND ANNOUNCEMENTS.

#### Meetings.

Meetings will be held as follows:  
Fitchburg, annual meeting, at the passenger station in Boston, Jan. 30, at 11:30 a. m.  
Housatonic, annual meeting, at the office in Bridgeport, Conn., Feb. 23, at 2:30 p. m.

#### Technical Meetings and Conventions.

The American Institute of Mining Engineers will hold its annual meeting in Boston, beginning on Tuesday, Feb. 20.  
The Master Mechanics' Association will hold its annual convention in Chicago, June 19 next.

#### Dividends.

Dividends have been declared as follows:  
Illinois Central, 3½ per cent., semi-annual, and an extra dividend of ½ per cent. from profits of Southern Line, making 4 per cent. in all, payable March 1. Transfer books close Feb. 10.  
Pullman's Palace Car Co., 2 per cent., quarterly, payable Feb. 15. Transfer books close Feb. 1.

#### Foreclosure Sales.

The Dorchester & Delaware road was sold at Cambridge, Md., Jan. 3, under a decree of foreclosure, and bought for \$51,000 by R. F. Barclay, for account of the Philadelphia, Wilmington & Baltimore Co. That company had previously made an agreement with the bondholders. The road is 28 miles long, extending from Cambridge, Md., to the Delaware line, where it connects with a branch of the Delaware Railroad.

#### Engineers' Club of Philadelphia.

The fifth annual meeting of this club was held in Philadelphia, Jan. 13, President Rudolph Hering in the chair, and 27 members present.

The Secretary and Treasurer presented his annual report. The net increase in the active membership for the year has been over 30 per cent.; the cash receipts have been over \$2,700, and the general status and future of the Club are very gratifying and promising.

The retiring President, Mr. Rudolph Hering, deliver the annual address.

After referring to the successful termination of the first five years of the Club, and to the accomplishments of sister societies during the past year, Mr. Hering reviewed the recent progress of engineering in the light of the theory of evolution. He showed how, from an indefinite scope, the profession had separated from the arts of architecture and warfare, and established itself as a distinct and definite branch; how later it divided into civil, mechanical and mining engineering, and how, at present, each of these new branches is once more developing into further specialties. In the civil engineering branch there are railroad, bridge, hydraulic and sanitary engineers. Among mechanical engineers, are those devoted to the building of different classes of machinery, and in the mining branch are those engaged in mining and preparing for the market different materials, as metals, coals and oils. The great advantage accruing from this specialization, is that more energy can be applied and concentrated in each direction and thereby progress made more easy.

He further showed that while there is an increasing separation into specialties, as in the world at large, there is an increasing union, based on the general diffusion of the mechanical science in its broadest sense, and enabling one class of engineers to use the matured results of the others, in advancing their own works, just as the increasing intercourse and union between nations and the diffusion of their habits, ideas and labors, has contributed in turn to the advancement of each one.

Among the practical advantages gained by realizing that the progress of engineering follows the same law of general progress, are that the profitable directions are more clearly indicated and that, on the other hand, we are cautioned against expecting too speedy or too great results of novel inventions and discoveries.

Mr. Hering then briefly referred to the important structures finished or under way during the year, which showed that almost in every direction previous works and records had been surpassed. Bridge building has become more daring, without sacrificing safety. Railroad building has reached an enormous activity. Ships, canals and extensive tunnels are increasing in number and in their capacity. He closed with a sketch of the progress in the different branches of city engineering, which includes water and gas supply; the furnishing of steam for heat and power and of electricity



for light and power; the removal of waste waters and the paving of streets.

The tellers of election reported that the following had been elected officers for 1888: President, Henry G. Morris; Vice-President, William A. Ingham; Secretary and Treasurer, Howard Murphy; Directors, T. M. Cleemann, Frederic Graff, Rudolph Hering, Strickland Kneass and Percival Roberts, Jr.

Mr. Henry G. Morris took the chair, with appropriate remarks.

The following were declared elected active members of the club: A. R. Cruse, R. H. Bartleman, Arthur Winslow, R. Seymour, M. W. Rudderow, H. T. Townsend, Wm. McIlvaine and W. J. Root.

The resignation of Mr. W. M. Black was read and accepted.

The attention of the Club was called to a preamble and resolutions which had been published in an engineering journal, in an article alluding to the Club and its members, and the Secretary was directed to inform the editor thereof, that no such preamble and resolution had ever been passed or put to vote, at any meeting of the Club.

Mr. George S. Strong exhibited drawings of his express locomotive, which he described.

## ELECTIONS AND APPOINTMENTS.

**Champlain Transportation Co.**—At the annual meeting last week the following directors were chosen: Le Grand B. Cannon, V. P. Noyes, I. V. Baker, A. L. Inman, George B. Chase, Russell S. Taft, E. Root. The board elected officers as follows: President, Le Grand B. Cannon; Vice-President, I. V. Baker; Treasurer, Vernon P. Noyes; Clerk and Superintendent, P. W. Barney; Chief Engineer, George Rushlow.

**Chesapeake, Ohio & Southwestern.**—Mr. D. W. C. Brown is appointed General Superintendent, with office in Louisville, Ky., in place of Robert Meek, resigned. Mr. Brown was formerly on the Cincinnati, Sandusky & Cleveland road.

**Cincinnati Northern.**—At the annual meeting in Cincinnati, Jan. 16, the following directors were chosen: George Wm. Ballou, Henry D. Hyde, Edgar M. Johnson, J. N. Kinney, Albert Netter, Gabriel Netter, Nelson Perrin, E. B. Phillips, John Ryan. The board elected E. B. Phillips President; Albert Netter, Vice-President; George Hafer, Secretary and Treasurer.

**Connecticut River.**—At the annual meeting last week the old board was re-elected, as follows: Frederick Billings, Woodstock, Vt.; W. R. Cone, Hartford, Conn.; Augustus T. Perkins, Barre, Mass.; Charles S. Sargent, Brookline, Mass.; Wm. B. Washburn, Greenfield, Mass.; Oscar Edwards, Northampton, Mass.; Wm. Whiting, Holyoke, Mass.; A. B. Harris, N. A. Leonard, Springfield, Mass.

**Engineers' Club of Philadelphia.**—At the annual meeting, Jan. 13, the following officers were chosen for the ensuing year: President, Henry G. Morris; Vice-President, Wm. A. Ingham; Secretary and Treasurer, Howard Murphy; Directors, T. M. Cleemann, Frederic Graff, Rudolph Hering, Strickland Kneass, Percival Roberts, Jr.

**Illinois & St. Louis.**—At the annual meeting in Belleville, Ill., Jan. 18, the following directors were chosen: Joseph W. Branch, Adolphus Meier, John D. Perry, C. S. Greeley, W. A. Hargadine, George Knapp, Thomas McKissock, B. F. Switzer, Russell Hinckley, G. A. Koerner, Jefferson Rainey, Jacob Kuntzler, A. C. Huckle, Thomas Winstanley, E. H. Wangelin. At a meeting of the new board Joseph W. Branch was re-elected President; Thomas McKissock, Vice-President; P. T. Burke, Secretary and Treasurer; C. H. Sharnan, General Superintendent.

**Jacksonville & Atlantic.**—At the annual meeting in Jacksonville, Fla., recently, J. Q. Burbridge was chosen President; J. J. Daniel, Vice-President; J. D. Burbridge, Secretary; J. M. Shumaker, Treasurer.

**Jonesboro & Cape Girardeau.**—The directors of this new company are: Oliver P. Baggott, Thomas F. Bouton, Alvan Cook, Wm. S. Day, Jonesboro, Ill.; Charles L. Otrich, Anna, Ill.

**Kansas City Union Depot.**—The following officers have been elected by this company: President, George H. Nettleton; Secretary, W. J. Ferry; Treasurer, C. C. Ripley; Superintendent, James D. Carson.

**Kentucky Central.**—At the annual meeting in Covington, Ky., Jan. 24, the following directors were chosen: C. P. Huntington, E. H. Pendleton, George H. Bliss, C. Alexander, B. S. Cunningham, John Echols.

**La Crosse & Southwestern.**—At the annual meeting in La Crosse, Wis., Jan. 16, the following directors were chosen: Joseph Clark, Charles Michel, J. S. Medary, G. R. Montague, James McCord, Mons Anderson, A. Hirschheimer, John Ulrich, Alex. McMillan. The board elected Joseph Clarke, President; Charles Michel, Vice-President; R. Calvert, Secretary; G. Van Steenwyk, Treasurer.

**Marshall, Jefferson & Northwestern.**—The officers of this new company are: President, W. W. Heartsill; Vice-President, W. B. Ward; Secretary, W. C. Pierce; Treasurer, L. W. Lloyd. Offices in Marshall, Tex.

**Maryland Central.**—At the annual meeting in Baltimore, Jan. 15, the following directors were chosen: Wm. H. Waters, Wm. Gilmor, Thomas Armstrong, H. R. McNally, Caleb S. Taylor, Foulk Jones, J. P. Street, Joseph M. Street, G. O. Wilson, Caleb J. Moore, C. W. Hatter, Eli Tucker, John M. Dennison. The board re-elected Wm. H. Waters, President; Wm. Gilmor, Vice-President; Thomas Armstrong, Treasurer; S. G. Boyd, Superintendent.

**Mexican Central.**—Mr. F. P. Griswold is appointed Superintendent of the Road Department, with headquarters at Lagos, Mexico.

**Mt. Vernon & Tamaroa.**—Officers have been chosen for this new company as follows: President, B. F. Johnson; Vice-President, J. H. Johnson; Secretary, John Wiseman; Treasurer, George Evans. Offices in St. Elmo, Ill.

**Natchez, Red River & Texas.**—At the annual meeting recently the following directors were chosen: James Houston, Hiram R. Steele, Vidalia, La.; Henry Frank, Isaac Lowenberg, Natchez, Miss.; George W. Deboise, Alfred R. Fiske, Joseph P. Hale, New York. The board met subsequently and elected Hiram R. Steele President; Alfred R. Fiske, Vice-President and General Manager; James Houston, Secretary and Treasurer; Joseph P. Hale, Alfred R. Fiske and George W. Deboise, Executive Committee.

**Newark, Somerset & Strainsville.**—This company has elected David Lee, President; J. Hope Sutor, Secretary and Treasurer. The road is leased to the Baltimore & Ohio.

**New England General Freight Agents Association.**—At a meeting held in Boston, Jan. 17, the following directors were chosen for the ensuing year: President, E. A. Chittenden, Central Vermont; Vice-President, F. L. Pomeroy, Ogdensburg & Lake Champlain; Secretary, W. F. Simons, Northern (New Hampshire).

**New Orleans Pacific.**—At the annual meeting last week the following board of directors was elected: Jay Gould, R. S. H. y, H. M. Hoxie, J. C. Brown, Russell Sage, W. B. Schmidt, W. Hartwell, Joseph Bowling, Samuel Boyd, J. J. Gidiers, J. H. Kenard, Adolph Schreiber, E. B. Wheelock, W. S. Nicholson, Adolph Meyer. Col. E. B. Wheelock was re-elected President and W. S. Nicholson Secretary. The road is owned by the Texas & Pacific Co.

**New Orleans Railroad Association.**—This Association has elected Cecil Fleming President; B. W. Cason, J. C. Andrews, J. K. Knight, Vice-Presidents; M. T. Elfert, Treasurer; C. L. Gillette, Corresponding Secretary; C. H. Ogilvie, Recording Secretary.

**New York, Ontario & Western.**—The new board has elected Edward F. Winslow President; Theodore Houston, Vice-President; Conrad N. Jordan, Treasurer; John L. Nisbet, Secretary and Assistant Treasurer.

**New York, Susquehanna & Western.**—The officers of this company as consolidated are: President, Frederick A. Potts; Vice-President, Wm. S. Dunn; Secretary, J. P. Rafferty; Treasurer, K. S. Chapel.

**Northern Pacific.**—Mr. J. M. Buckley is appointed Assistant General Manager, with charge of all the company's lines on the Pacific Coast, in Oregon, Washington and Idaho. Office at New Tacoma, Wash. Ter. He succeeds Gen. J. W. Sprague, resigned.

**Ohio River, of West Virginia.**—The directors of this company (formerly the Wheeling, Parkersburg & Charleston) are: R. S. Brown, E. H. Browne, B. W. Byrne, W. N. Chancellor, Septimus Hall, John McLure, D. R. Neal, W. F. Peterson, E. Sehon, C. H. Shattuck, G. W. Thompson.

**Oregon Short Line.**—At the annual meeting recently the following directors were chosen: M. S. Burrell, S. H. H. Clark, Ellis G. Hughes, Thomas L. Kimball, B. J. Pengra, Andrew J. Poppleton, D. P. Thomson. The company is controlled by the Union Pacific.

**Pennsylvania Company.**—The following circulars, dated Jan. 22, announce officially some changes already noted:

"Mr. John E. Davidson is appointed Treasurer of this company, in place of W. H. Barnes, resigned. Mr. John P. Henderson, formerly Cashier, is appointed Assistant Treasurer. Both appointments to take effect this date."

"Mr. John W. Renner is appointed Assistant Comptroller of this company, in place of John E. Davidson, resigned to assume the office of Treasurer. Appointment to take effect this date."

**Pittsburgh, Cincinnati & St. Louis.**—The following circulars, announcing officially changes already noted, are dated Pittsburgh, Jan. 22.

"Mr. John E. Davidson is appointed Treasurer of this company. Mr. M. C. Spencer, formerly Treasurer, is appointed Assistant Treasurer. Both appointments to take effect this date."

"Officers, agents and conductors of this company will make their remittances to the designated depositories to the credit of M. C. Spencer, Assistant Treasurer P. C. & St. L. Ry. Co., and also communicate with him in relation thereto. Officers of other companies will make remittances for account of this company to the Assistant Treasurer. Drafts for current ticket, freight and mileage balances due by this company should be made on him."

"Mr. John W. Renner is appointed Assistant Comptroller of this company, in place of John E. Davidson, resigned to assume the office of Treasurer. Mr. Albert McElevey is appointed Auditor, in place of Mr. Renner, promoted."

**Providence, Webster & Springfield.**—The directors of this new company are: Edwin Bartlett, Oxford, Mass.; E. P. Morton, Dudley, Mass.; John Rhodes, Milbury, Mass.; Amos Bartlett, C. K. Larabee, Asher T. Moore, Horatio N. Slater, Webster, Mass.; Oscar F. Chase, Thompson, Conn.; Horatio N. Slater, Jr., Providence, R. I.

**St. Louis Elevated & Rapid Transit Co.**—The directors of this new company are: George W. Allen, W. D. Griswold, R. C. Kerens, John G. Priest, O. D. Tucker, St. Louis; A. Bonzano, Phoenixville, Pa.; F. A. Marquand, Robert I. Sloan, A. W. Soper, New York.

**St. Louis, Iron Mountain & Southern.**—Mr. T. W. Kennan has been appointed Train-Master of the Third Division, from Texarkana to Little Rock, in place of J. T. Whedon, transferred to the Texas & Pacific, New Orleans Division. Mr. Kennan was recently on the New York & New England road.

**Smyrna & Delaware Bay.**—This company has elected John F. Bingham, President; R. W. DeForest, Secretary; H. C. Douglas, Treasurer; John R. Nicholson, Attorney; L. D. Bruyn, Engineer.

**Southwestern Passenger Pool Commission.**—At a meeting held in Chicago, Jan. 23, the representatives of the roads interested elected as Commissioner of the Chicago-St. Louis-Kansas City passenger pool Mr. John Given, now Superintendent of the Keokuk & Des Moines Division of the Chicago, Rock Island & Pacific road. Mr. Given has since declined.

**Texas, Santa Fe & Northern.**—The board has elected Thomas B. Catron President; Bernard Seligman, Vice-President; John Symington, Secretary; Lehman Spiegelberger, Treasurer. Offices in Santa Fe, N. M.

**Tidewater Pipe Line.**—At the annual meeting in Titusville, Pa., Jan. 18, the following managers were chosen: Franklin B. Gowen, James R. Keene, T. S. McFarland, John Satterfield, D. B. Stewart. Messrs. McFarland, Satterfield and Stewart are new members of the board, replacing B. D. Benson, R. E. Hopkins and A. M. Perrin. The board elected John Satterfield Chairman; D. B. Stewart, Secretary; T. S. McFarland, Treasurer. This election is contested.

**Union Pacific.**—Mr. W. P. Cooley is appointed Traveling Passenger Agent for this company, in charge of District No. 3 (Pennsylvania and New Jersey), with headquarters in Philadelphia. Appointment took effect Jan. 15.

Mr. Geo. W. Keeler is appointed General Agent of this company for Pennsylvania and New Jersey, with headquarters in Philadelphia. Appointment to take effect Feb. 1.

**Vernon, Greensburg & Rushville.**—At the annual meeting last week the following directors were chosen: W. W. Hamilton, J. E. Robinson, Greensburg, Ind.; F. Hall, Rushville, Ind.; Horace Scott, Louisville, Ky.; B. S. Cunningham, A. R. Forsythe, M. E. Ingalls, Cincinnati, O. The board elected Horace Scott President; C. Ewing, Secretary; E. F. Osborn, Treasurer.

**Waynesburg & Washington.**—At the annual meeting in Washington, Pa., recently, the following were chosen: President, J. F. Temple; Directors, J. J. Brant, A. Day, B.

Gordon, Julius LeMoine, Samuel Luse, W. T. Lantz, B. McCallum, R. A. McDonnell, Joseph Ritchie, T. W. Sayers, D. A. Spragg, Joseph Swart.

**Western Classification Committee.**—At the last meeting of the general managers of the Western roads the Commissioners of the various pools and traffic organizations were instructed to select a joint classification committee—one member from each pool or association—to which all applications for additions to and changes in the joint westward classification should be referred. In accordance with those instructions, the following committee has been selected by the Commissioners: E. P. Ripley, Colorado Traffic Association; A. C. Bird, Iowa Trunk Line Association; George Olds, Southwestern Railway Association; W. S. Mellen, Northwestern Traffic Association; and Horace Tucker, Chicago & St. Louis Traffic Association. The committee met in Milwaukee Jan. 15 and organized by the election of Mr. W. S. Mellen as Chairman.

**Woodstock.**—The following officers have been elected for the ensuing year: President, Frederick Billings; Clerk, Charles M. Marsh; Treasurer and Superintendent, James G. Porter; Manager, S. S. Thompson; Engineer, Hosea Doton. Offices in Woodstock, Vermont.

## PERSONAL.

—Dr. Edward H. Knight, author of the *American Mechanical Dictionary* and other works, died at his residence in Bellefontaine, O., Jan. 22.

—It is reported that Mr. A. B. Southard has resigned his position as General Freight Agent of the Louisville, New Albany & Chicago road, to take effect Feb. 1 next.

—It is now stated that Mr. T. A. Phillips will not resign his position as General Manager of the Toledo, Cincinnati & St. Louis road, but will continue in charge of the road.

—The report that Mr. Charles J. Brydges, formerly of the Great Western and the Grand Trunk roads, was to be appointed General Manager of the Canadian Pacific road, is contradicted by authority.

—Gen. Adin D. Clay died at Lynchburg, Va., Jan. 17, aged 81 years. He was one of the projectors and the first President of the Virginia & Tennessee road, now part of the Norfolk & Western. He had also served in the Legislature and as a member of the Virginia Board of Public Works, and in other positions of prominence.

—Emil David, an old civil engineer, shot and killed himself in Pittsburgh, Jan. 22. It is supposed that he was despondent on account of his failure to procure employment. He was at one time Chief of the survey of the Low Grade Division of the Allegheny Valley road, and was for a long time with the contracting firm of Patterson & Co., of Pittsburgh. He leaves a wife and seven children, who live in Brookville, Pa.

—Mr. Joseph Sailer, for many years Financial Editor of the *Philadelphia Ledger*, died at his residence in Philadelphia, Jan. 15, aged 73 years. From 1840 until 1880, Mr. Sailer was continually at his work, and acquired a high reputation for integrity and sound judgment. He was intimate with nearly all the older generation of Philadelphia railroad officers and his advice on financial questions was frequently asked.

—Gen. J. W. Sprague has resigned his position as General Superintendent of the Western Division of the Northern Pacific Railroad on account of ill health, and will go to Southern California for a time. General Sprague served with distinction during the war, and was afterwards connected with the Winona & St. Peter road as Engineer and General Superintendent. In 1870 he was appointed General Agent of the Pacific Division of the Northern Pacific, and has ever since had charge of the company's interests in Oregon and Washington.

—Mr. Solomon Drullard, an old and well-known citizen of Buffalo, N. Y., died at his residence in that city Jan. 17, aged 75 years. Mr. Drullard was born near London, Ont. He went to Buffalo when about 20 years old and had lived there ever since. For a number of years he was a member of the transportation firm of Kimberly, Pease & Co. Subsequently he was appointed General Freight Agent of the New York Central, and later of the New York Central & Hudson River Railroad. This position he held for 20 years, during the latter part of which he was also a director of the company. After leaving the service of the road he became a member of the firm of Drullard & Hayes, with which he has been connected since.

## TRAFFIC AND EARNINGS.

### San Francisco-New Orleans Passenger Rates.

The Central and Southern Pacific lines announce the following rates of passage from San Francisco to New Orleans: For first-class tickets, with stopover privileges, \$98.50; for second-class tickets for a continuous trip, \$80; for third-class tickets for a continuous trip, \$55.

This makes the first class unlimited rate from San Francisco to New York via New Orleans about \$144, and the third-class rate \$79.50 for a continuous trip.

### Grain Movement.

For the week ending Jan. 13 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the last seven years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1877.....	1,632,416	638,319	1,217,472
1878.....	4,158,086	1,797,607	3,275,956
1879.....	3,123,153	1,417,308	2,394,162
1880.....	2,739,454	1,157,345	2,575,823
1881.....	2,890,312	1,955,339	1,880,419
1882.....	4,252,751	2,479,443	1,526,637
1883.....	3,974,668	3,001,040	3,058,404

The receipts of the Northwestern markets were 7 per cent. less than last year and 4½ per cent. less than in 1878, but larger than in the corresponding week of any other year. They were, however, 409,000 bushels less than the previous week and still smaller than in any earlier week of this winter.

The shipments of these markets were larger than in the corresponding week of any previous year, larger than in any previous week since navigation closed, and have been equalled in a winter week only twice before. No river shipments are reported this week.

The Atlantic receipts were twice as great as in the corresponding week of last year, and larger than in the corresponding week of any previous year except 1878. They were 5 per cent. less than the week before, but larger than in any of the last three weeks of December.

The exports of corn for this week were nearly as large as the wheat exports, which has not happened before for many months. There were considerable corn exports from New Orleans, for the first time for more than a year. The total New Orleans receipts were the largest since September;



the New York receipts were the smallest, with one exception, since September.

Exports from Atlantic ports for the week ending Jan. 17, for three years have been:

	1881.	1882.	1883.
Flour, bbls.....	131,278	83,052	154,006
Grain, bus.....	1,023,952	1,175,043	2,413,970

The total this year is about 100 per cent. more than last year, and 40 per cent. more than in 1881.

For the week ending Jan. 20 receipts and shipments at Chicago and Milwaukee were:

	Receipts.		Shipments.	
	1883.	1882.	1883.	1882.
Flour, bbls .....	162,474	167,889	180,296	173,681
Grain, bus. ....	1,993,819	2,935,583	1,742,593	1,994,607

There was thus a decrease of 3 per cent. in the flour receipts and of 32 per cent. in the grain receipts. They were unusually large last year in this week, and this year were somewhat reduced by the snow blockades. The shipments, though those of grain are less than last year, were yet large.

For the week ending Jan. 20 receipts at four Eastern ports for three years have been:

for three years have been:						
<i>Bushels:</i>	New York.	Boston.	Phila.	Baltimore.	Total.	
1883.....	959,727	451,350	382,450	490,018	2,292,545	
1882... ..	1,257,870	259,826	203,140	178,672	1,899,508	
1881 .....	945,784	391,000	333,000	374,802	2,044,726	
<i>P. c. of total:</i>						

P. c. of total.	1883.	1882.	1881.
1883.....	41.9	19.7	10.0
1882.....	66.2	13.7	10.7
1881.....	46.3	19.1	18.3

Philadelphia and Baltimore together received 38.4 per cent. of the whole this year, against 20.1 last year, and 34.6 per cent. in 1881.

#### Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending Dec. 31.	1882.	Inc. or Dec.	P. c.
Alabama Great Southern.....	\$850,721	\$79,572 I.	8.5
Des Moines & Ft. Dodge.....	247,108	4,195 D.	1.6
Detroit, Lansing & N. O.....	1,591,991	1,377,698 I.	217.233
Houston, E. & W. Texas.....	290,869	16,728 I.	101.132
Houston & Texas Central.....	3,177,389	3,748,635 D.	573.306
Kan. City, Ft. Scott & Gulf.....	1,739,382	1,544,336 I.	106.826
Marquette, Houghton & Ont. L.	1,197,426	9,635,919 I.	203.917
Nashville, Chatt. & St. L.....	1,383,047	2,075,258 D.	142.211
Net earnings.....	787,831	7,516 I.	4.065
Norfolk & Western.....	2,432,749	2,207,298 I.	102.452
Net earnings.....	1,107,161	1,110,856 D.	3.692
Peoria, Dec. & Evansville.....	76,529	68,972 I.	72.47
Pennsylvania.....	49,759,634	44,121,181 I.	4,638,451
Net earnings.....	18,428,824	1,414,372 I.	1,018,434
Richmond & Danville.....	3,657,930	3,566,862 I.	91.68
St. Louis & Cairo.....	280,416	427,063 D.	47.247
Vicksburg & Meridian.....	453,357	1,415,363 I.	311.818
Virginia Midland.....	145,363	1,324,241 I.	81.818
Eleven months ending Nov. 31:			
St. Johnsbury & L. Champe.....	\$241,132	\$108,105 I.	\$43,027
Six months ending Dec. 31:			
Nash. C. & St. L. Main Stem.....	\$1,046,302	\$806,033 I.	\$50,269
Net earnings.....	452,255	394,773 I.	58.477
Branches.....	135,232	.....	.....
Net earnings.....	75,060	.....	.....
Month of November:			
Danbury & Norwalk.....	\$18,097	\$17,604 I.	\$493
Mexican National.....	77,240	.....	.....
N. Y. Lake Erie & Western.....	1,918,824	1,715,469 I.	103,765
Net earnings.....	77,240	629,732 I.	21.5
St. Johnsbury & L. Champe.....	24,384	19,439 I.	5,945
Month of December:			
Ala. Great Southern.....	\$91,729	\$86,807 I.	\$7,882
Chatt. & And. & Augusta.....	7,597	69,972 I.	7.06
Des Moines & Ft. Dodge.....	28,410	3,246 D.	6.876
Detroit, Lansing & N. O.....	123,813	121,141 I.	3,672
Houston, E. & W. Texas.....	33,070	31,811 I.	4,258
Houston & Texas Central.....	430,782	376,747 I.	54,035
Kan. City, Ft. Scott & Gulf.....	16,618	10,063 I.	8,555
Marquette, Houghton & Ont. L.	2,900	19,000 I.	4,000
Memphis & Charleston.....	146,148	137,491 I.	9,657
Mexican Central, No. Div.	25,512	.....	.....
Southern Div.....	148,164	.....	.....
Nashville, Chatt. & St. L.....	186,352	175,127 I.	13,225
Net earnings.....	87,001	78,462 I.	9,539
Norfolk & Western.....	2,247,878	2,000,000 I.	247,878
Net earnings.....	101,182	109,089 D.	807.08
Peoria, Decatur & Evans.....	49,102	78,704 I.	9.62
Pennsylvania.....	4,177,259	3,731,811 I.	445,448
Net earnings.....	1,214,912	1,214,912 I.	18,309
Richmond & Danville.....	322,148	361,938 D.	38,790
St. Louis & Cairo.....	34,963	41,993 D.	6,433
Vicksburg & Meridian.....	67,28	67,97 D.	69
Virginia Midland.....	108,346	119,384 I.	10,938
Second week in January:			
Chicago & Eastern Illinois.....	\$3,349	\$36,210 D.	\$4,930
Chicago & Grand Trunk.....	2,520	2,520 D.	2,738
Chicago, Mil. & St. P.....	3,800	3,375 D.	2,575
Chicago & Northwestern.....	30,455	38,049 D.	35,761
Louisville & Nashville.....	212,541	221,841 I.	19,300
Norfolk & Western.....	9,101	20,409 I.	30,655
St. Paul, Minn. & Man.....	128,069	10,946 I.	20,624
Wabash, St. Louis & P.....	32,700	200,383 I.	20,312
Third week in January:			
Denver & Rio Grande.....	\$85,800	\$101,700 D.	\$15,900

#### Coal.

Coal tonnages for the week ending Jan. 13 are reported as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Anthracite.....	570,084	584,014 D.	13,930	2.4
Semi-bituminous.....	90,495	101,198 D.	10,703	10.6
Bituminous, Penna.....	71,972	65,374 I.	6,598	10.1
Coke, Penna.....	72,912	58,687 I.	14,225	24.2

Anthracite business is still rather dull, although prices have stiffened somewhat since the announcement of a suspension of mining three days in each week. This suspension is to continue until a further agreement is made.

The coal tonnage of the Pennsylvania Railroad Division for the week ending Jan. 13 was 165,576; coke, 72,912; total, 238,488 tons. Of this tonnage 131,003 tons coal and 49,524 tons coke were mined on the line, the balance—34,573 tons coal and 23,985 tons coke—received from other lines. The total tonnage this year to Jan. 13 was 457,058 tons.

The official statement of coal tonnage for December is as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Phila. & Reading.....	644,424	631,117 I.	11,307	1.8
Lehigh Valley.....	524,932	595,025 D.	70,093	11.9
Central of N. J.....	343,349	406,837 D.	58,488	14.4
Dela., Lacka. & Western.....	408,650	425,914 D.	17,264	4.0
Del. & Hudson Canal Co.....	296,720	300,730 D.	4,410	1.4
Pennsylvania R. Co.....	163,373	180,532 D.	17,159	9.5
Pennsylvania Coal Co.....	125,276	142,163 D.	16,887	11.8
N. Y. Lake Erie & Western.....	88,116	40,408 I.	47,708	118.1

Total.....2,599,440 2,724,726 D. 125,286 4.6

The stock of coal on hand at tidewater shipping points Dec. 31 was 562,116 tons, an increase of 26,225 tons during the month, and an increase of 65,092 tons, as compared with Dec. 31, 1881.

The Official Accountant's statement of anthracite coal tonnage for the year was as follows:

	1882.	1881.	Inc. or Dec.	P. c.
	Tons.	P. c. of total.	Tons.	P. c. of total.
Phila. & Reading.....	7,000,113	24.0	6,940,383	24.3
Lehigh Valley.....	5,933,740	20.4	5,721,870	20.1
Central of N. J.....	4,211,032	14.5	4,083,424	14.3
Del., Lack. & Western.....	4,638,717	15.9	4,358,960	15.4
Del. & Hudson Canal Co.....	3,203,163	11.0	3,211,496	11.3
Pennsylvania R. Co.....	2,332,974	8.0	2,211,363	7.8
Pennsylvania Coal Co.....	1,499,821	5.0	1,475,380	5.2
N. Y. Lake Erie & Western.....	330,511	1.2	405,231	1.6

Total.....29,120,000 100.0 28,500,016 100.0

Increase for the year, 620,000 tons, or 2.1 per cent. The Delaware & Hudson and the Pennsylvania Coal Co. show small decreases and the Erie a considerable loss; the other five companies gained in tonnage.

The division of the output between the three great subdivisions of the anthracite region was as follows:

	Tons.	Percent of total.
Schuylkill Region.....	9,459,288	32.5
Lehigh Region.....	5,694,437	19.5
Wyoming Region.....	13,971,371	48.0

Total.....29,120,000 100.0

The competitive tonnage for the year, including all coal which for final consumption or in transit reaches any point on Hudson River or the Bay of New York, or which passes out of the Capes of the Delaware, was: 1882, 12,018,764; 1881, 12,169,030; decrease, 150,266 tons, or 1.2 per cent.

The Illinois & St. Louis Railroad carried between Belleville and East St. Louis last year 6,778,881 bushels of coal, an increase of 734,881 bushels, or 12.2 per cent., over 1881.

Shipments of coal over the Columbia & Puget Sound road and by sea from Seattle, Wash. Ter., for the year ending Dec. 31 were: 1882, 151,418; 1881, 147,418; increase, 4,000 tons, or 2.7 per cent. The total amount shipped from Seattle since 1871, when the trade began, is 1,627,976 tons. For the six years from 1871 to 1876 inclusive, the average shipments were 36,176 tons per year; for the six years from 1877 to 1882, inclusive, the average has been 134,985 tons a year.

Shipments of coal from the mines on Cape Breton Island in 1882 were 574,581 tons.

Cumberland coal shipments for the week ending Jan. 20 were 28,293 tons. The total shipments this year to Jan. 20 were 102,501 tons.

#### Lumber Rates.

A meeting was held in Chicago last week for the purpose of adjusting rates on lumber, complaint having been made that the rates from Chicago and Michigan City were too high in proportion to those from Michigan points. After a full discussion, it was decided to readjust the rates, and a committee was appointed to decide on the necessary changes.

#### RAILROAD LAW.

**Railroad Track in a Street—Damages to Adjoining Property.**

The owner of lots on a street in Denver, upon which he had erected a hotel and dwelling house, sued the Union Pacific Railroad Company to recover damages for the injury to his property by the laying of its track in the street. This track was put down 18½ feet from the pavement and above the level of the street, so that wagons could not freely pass to and from the houses. The company set up as its defense that the track had been laid by virtue of an ordinance which granted it the right of way through the street. The plaintiff recovered a judgment for \$1,850 in this case—Malandin vs. Union Pacific Railroad Co.—in the United States Circuit Court for Colorado. Judge Hallett, in the opinion, said: The right and interest of the plaintiff in the street in front of his property is secured to him by section 75 of the Bill of Rights of the state constitution, which declares "that private property shall not be taken or damaged for public or private use without just compensation." It has been said that property cannot be "taken" within the meaning of that provision except by an appropriation of the land itself, but no such limitation is applicable to the clause relating to damages. The beneficial use of plaintiff's estate embraces the right of ingress and egress, which cannot be withdrawn or obstructed without substantial damage to it. The use of the street is therefore a right of property in plaintiff, which, if not "taken," is certainly "damaged," within the meaning of the constitution, by the act of defendant in building its road through the street.—Baltimore Day.

#### OLD AND NEW ROADS.

**Atlantic & Pacific.**—The Boston Advertiser of Jan. 23 says: "Stories have been in circulation of a difference of opinion in the directory of the Atlantic & Pacific Railroad Co. as to the future policy of that corporation. As has been stated in the Advertiser, the contracts for building the road to the Needles, on the Colorado River, where it is to meet a branch of the Southern Pacific, are well along toward completion, and the money to finish it to that point is all subscribed. Every dollar's worth of work done each month is paid for in cash, and so rapid is the progress of the construction corps that it is expected the Atlantic & Pacific will reach the Needles by the middle of April. As is well known to persons familiar with railroad matters, the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco are equally interested in the completion of the line under the tripartite agreement of Jan. 31, 1880. The report alluded to above was to the effect that the Atchison interest in the Atlantic & Pacific is desirous of pushing the completion of the line to the Pacific, independently of the Southern Pacific, while the St. Louis & San Francisco interest, which is closely allied with the Southern Pacific, opposes any such extension. It can be stated on authority that no such question has been discussed in the Atlantic & Pacific board, and that whatever opinions any individual director may hold, they keep them to themselves. It is extremely probable that the future policy of the road will be determined after the track is completed to the Needles. Should a satisfactory traffic arrangement be offered by the Southern Pacific, no extension of the Atlantic & Pacific is probable at present. Fears have been expressed by some persons who feel an interest in the Atlantic & Pacific as at least half a Boston institution, but who have only a slight familiarity with the terms of the Atchison-Frisco protectorate, that a majority of the \$3,300,000 in stock to be issued during the coming spring to the subscribers to the latest series of blocks may be secured by the Huntington interest, and thus a preponderance in the ownership be secured by an adverse party. Such apprehensions are devoid of foundation, as will be seen by a reference to the terms of the tripartite agreement under which the road is being built. When this agreement was made, and as a consideration thereof, \$19,500,000 of the common stock of the Atlantic & Pacific was issued to the Atchison and the Frisco, jointly, in equal shares, and placed in the hands of Henry P. Kidder, New Warren Sawyer, of Boston, and John A. Stewart, of New York, as trustees, for 30 years. Subsequently, \$31,750,000 more was put into the same box, under the same restrictions, which are that this stock shall be voted as a unit by the trustees for 13 directors of the Atlantic & Pacific, 6 to be chosen by the Atchison, 6 by the Frisco, and the other by the agreement of the two interests, if possible, or, failing in that, by the trustees. In the case of the present board, Colonel Henry C. Nutt, the President, was agreed upon by both the Atchison and Frisco interests. Thus it will be seen that over \$51,000,000 of the capital of the Atlantic & Pacific must be voted as a unit by the trustees, and this is far more than a controlling interest of the stock, there being only \$4,950,000 at present outside the trustees' box, and \$3,800,000 to be issued this spring, the whole making up an aggregate of \$59,000,000 of stock outstanding. This preponderating interest of \$51,000,000 must go in a block, and cannot for 30 years be broken up, so that it is of no special importance who owns the outside stock. The only two ways in which this block can be divided are: first,

a vote of three-quarters of the directors of the three companies; second, the bankruptcy and foreclosure of the Atlantic & Pacific—neither of which contingencies is probable."

**Austin & Northwestern.**—It is reported that this road has been sold to the Texas & St. Louis Co., and will be made a branch of that road. The line is of 3-ft. gauge, and is now in operation from Austin, Tex., to Burnet, 60 miles. It has been in the market for some time.

**Boston, Hoosac Tunnel & Western.**—Judge Barrett, in the New York Supreme Court, in a suit brought by the Boston, Hoosac Tunnel & Western Railroad Co., against the Continental Construction & Improvement Co., the Central Trust Co., of New York, and others, has granted a temporary injunction restraining any interference by the defendants with \$6,000,000 of first-mortgage bonds of the plaintiff company which are on deposit with the Central Trust Co. The defendants claim that these bonds are held by the Central Trust Co., as agents of a committee in accordance with an agreement by which the bonds were to be distributed among the subscribers to the agreement on Jan. 1 last. The case is now on trial.

It was reported last week that the proposed sale of this company's property west of Schenectady to the New York, West Shore & Buffalo Co. had fallen through, on account of legal obstacles to the transfer. Another statement is to the effect that the final closing of the agreement has been delayed by some difference over details, but that matters are being arranged and that the agreement will be closed in a few days.

**Boston & Lowell.**—The Boston Advertiser of Jan. 20 says: "The authors of the reiterated statements of impending consolidations of the Boston & Lowell with the Boston & Maine and various other railroads have at least the merit of persistency, but they have not as yet hit on the right road for the party of the second part. It is not the Boston & Maine at all, but the Boston, Winthrop & Point Shirley. There can be no question on the part of any one who will attentively study the map of the desirability of the union of these two railroads to form a trunk line. All that is needed is the building of a link from Winthrop Junction to College Hill via Chelsea and Everett and the laying of a third rail on the whole of the consolidated system of roads to accommodate rolling stock of both gauges. This would add at least seven miles to the mileage of the Boston & Lowell and enable it to deliver through freights at the magnificent tide-water terminal at Point Shirley, so graphically described by Mr. A. P. Blake to the Winthrop people the other evening."

**Canadian Pacific.**—A cable dispatch, dated Jan. 24, to the Toronto Globe says: "Although no official announcement has yet been made, it has been currently stated in financial circles during the last few days that the Canadian Pacific Railway Company has successfully completed all negotiations to issue its new stock in New York and Amsterdam. It is stated to-day on the highest authority that this statement is correct. Everything has now been settled on satisfactory terms."

This company's statement to the New York Stock Exchange, in connection with the listing of its stock, says: "In answer to your inquiry in regard to the financial ability of the Canadian Pacific Railway Co. to complete the unfinished portions of the road, and its resources for that purpose, we would report to this effect: That we have now completed and in operation 1,730 miles, leaving 1,576 miles yet to complete, of which the Dominion government builds at its own expense and transfer to us the portion of road from Port Moody to Kamloops, consisting of 213 miles, thus leaving for the company to build 1,363 miles; the resources for which are the balance of the cash subsidy from the government, amounting to \$17,324,112; the proceeds of land-grant bonds not yet drawn from the government, amounting to \$13,191,734; the proceeds of about 18,000,000 acres of selected land, fit for settlement, which the company will hold after retiring the balance of the existing land-grant bonds, and the proceeds of the \$75,000,000 of stock remaining to be issued, of which a syndicate has just been formed to take \$30,000,000. The 1,730 miles now in operation consist partly of the road built and turned over to the company by the government; partly of the road acquired by purchase, as stated in the official memorandum which accompanied our application, and partly of the line constructed by the company. The latter portions and the cost of the equipment of the whole line have been provided for by the company from its own capital and from the government subsidies applicable thereto. Under the general law of Canada each railroad is authorized to pay during construction up to 6 per cent. per annum to the stockholders on their stock. The company has paid 6 per cent. upon the stock issued, but we propose hereafter to only pay 5 per cent. upon the capital stock, and that is to apply to all the stock."

**Chattahoochee.**—This company has for some time used the Elizabeth, Lexington & Big Sandy track for about a mile through Catlettsburg, Ky., but had begun to build a track of its own. The Big Sandy Co. has now forbidden the use of this track, unless certain claims for right of way are settled.

**Chicago & Alton.**—This company has given out orders for 15 new engines and 500 freight. There are also a number of cars in progress at the Bloomington shops.

**Chicago, Burlington & Quincy.**—This company has located an extension of its tracks through the town of Sterling, Ill., and a new bridge over Rock River. The road will be built in the Spring, and will have connections with several large manufacturing establishments.

**Chicago, Milwaukee & St. Paul.**—W. E. Powell, Emigration Agent of the company, has compiled statistics of the growth of population in the counties on the lines of the company in Dakota. From Jan. 1 to Oct. 31, 1882, ten months, in 23 counties, the population increased from 43,176 to 90,790, or more than 100 per cent. The population, however, was still very light, averaging less than 4,000 per county. The increase of population in 1881 and 1882 on three lines is given as follows:

	1881.	1882.
Hastings & Dakota Division.....	2,500	7,470
Southern Minnesota Division.....	834	2,380
Iowa & Dakota Division.....	1,840	4,860

The acreage in cultivation, the yield per acre and the total production in 1882 in 23 Dakota counties served by this company's lines are given as follows:

	Acres.	Bu. per acre.	Production, bu.
Wheat.....	310,035	23 1/4	1,196,940
Oats.....	133,420	50 1/4	7,057,510
Rye.....	17,148	31 1/4	518,300
Barley.....	46,480	33 1/4	1,540,400
Flax.....	84,900	15 1/4	1,171,500

**Chicago & Eastern Illinois.**—The Chicago, Danville & Vincennes foreclosure case, as remanded by the Supreme Court, came up in the United States Circuit Court in Chicago, Jan. 17. On behalf of the old company counsel claimed that the foreclosure having been set aside, the case is in the same position as if no sale had been made, and the



new company must account for the net income of the road.

On behalf of the Chicago & Eastern Illinois Co. it was claimed that it was in the position of an innocent purchaser, and that it would be impossible to separate the earnings of the old road, owing to the changes and consolidations made. It was further claimed that the company had issued its bonds to the old bondholders who generally joined in the purchase of the road, and that it holds in this way most of the old bonds. The trustees have been directed to foreclose the old mortgage at once.

**Chicago, Springfield & St. Louis.**—This company has been incorporated to build a new line from Springfield, Ill., to East St. Louis. It is said to be in the interest of the Illinois Central.

**Chicago & West Michigan.**—Surveys are being made for an extension of the Hart Branch from Hart, Mich., northward. The line is to be run as far as Manistee, about 35 miles from Hart.

**Cincinnati Northern.**—At the annual meeting last week, after some discussion, a compromise was arranged between the Boston interest in the road and the Cincinnati stockholders named a majority of the board, and insisted upon a modification of the terms of the proposed consolidation with the Toledo, Cincinnati & St. Louis Co. The modifications are in favor of the local stockholders. It is understood that the consolidation will now be completed as soon as the agreements can be drawn up and ratified according to law.

No report of the operations of the road was presented at the meeting, further than a general statement that the net earnings were about \$4,000 per month.

**Danville, Olney & Ohio River.**—Some of the creditors of this company have filed objections to the issue of \$100,000 in certificates as proposed by Receiver Howard. Mr. Howard announced his intention of resuming traffic over the road on Jan. 16.

**Delaware River & Lancaster.**—The contractors for grading this road between Phoenixville, Pa., and the Falls of French Creek, have begun work in South Coventry township, near Pottstown.

**Eastern Maine.**—The Maine Legislature has passed a bill to allow this company to extend its road from Bucksport, Me., to some point upon the island of Mt. Desert, and a branch line from some point in the city of Ellsworth to some point upon Frenchman's Bay, in the town of Lamoine. Bonds to the amount of \$750,000 may be issued for the construction of the line. Until March 1, 1885, is given to locate the railroad and its branches, and until March 1, 1887, to construct the same. The bill also gives the company authority to lease its road and to lease other lines.

**Eureka Springs.**—Track on this road is now laid to Eureka Springs, Ark., 24 miles east by south from the junction with the St. Louis & San Francisco road at Seligman, which is just on the state line between Arkansas and Missouri. The road will be opened for business about Feb. 1.

**Hannibal & St. Joseph.**—The latest report in relation to this road is that it is to be leased to the Chicago, Burlington & Quincy and the Wabash, St. Louis & Pacific under a joint agreement, the lessees to guarantee 7 per cent. on the preferred stock and a small dividend on the common stock. Officers of the company decline to give any definite information.

**Hartford & Harlem.**—Chief Engineer Bryson, of this proposed road has prepared an estimate of its probable cost. Including equipment his estimate is \$8,520,000. But if the road connects with the New York & New England at New Britain, eight or nine miles of track and \$350,000 can be saved. The road will be double-tracked with steel rails, the bed 30 ft. wide through cuts, and 25 ft. on embankment at sub-grade. The cost of steel rails is based at \$50 a ton, as the present exceptionally low price of \$40 is not expected to last. The bridges will be of iron, and there will be but one draw-bridge, which will cross the Housatonic River. The Saugatuck is to be spanned by a high-grade viaduct, 83 ft. above high tide. The enabling act which will come up before the Connecticut Railroad Committee, provides that mortgages may be made to one or more trustees, to be approved by the Governor. This is similar to the New York & New England Railroad's arrangement. This arrangement is necessary, as in Connecticut to all such papers the State Treasurer and his successors in office are made parties; but, as a similarly worded mortgage could not be given in New York, in the present instance the trustees and their successors are to be named. No special privileges in relation to bonds are asked.

**Hot Springs.**—It is stated that this company, whose line is now about 30 miles long, from Hot Springs, Ark., to the Iron Mountain road at Malvern, is having a survey made for an extension from Malvern to the Texas & St. Louis road near Pine Bluff. This distance is about 55 miles.

**Illinois & St. Louis.**—At the annual meeting last week the reports presented showed that the length of the road, including the Venice and Carondelet belt and branches, is 41½ miles. There are also 8 miles of belt road under construction. The Illinois & St. Louis has been in successful operation for the past 12 years. The number of bushels of coal transported in 1882 was 6,778,881, against 6,044,000 bushels the year before. The amount of tonnage handled other than coal between St. Louis and Belleville during the year was 23,981 tons, an increase of about 7 per cent. over 1881. The total number of passengers transported for the year was 147,317. The company has 10 first-class locomotives, 426 coal cars and 10 box freight cars, and a number of passenger chaches. A transfer is operated at Chouteau avenue, with two ferry-boats in use, and 7,157 cars were transferred, being an increase of 3,360 cars over 1881.

Among the improvements made within the past year were additional tracks laid and fillings made, and the amount of money spent on the work was \$85,000. The company owns 4,042 feet on the river front in East St. Louis, the yard comprising 317 acres; and an elevator with a million bushels capacity has been erected thereon by the East St. Louis Elevator Co. There is also on the same ground a grain transfer and weighing house, which promises well. The terminal and belt road facilities are such that connection is made with all the roads, and with the Madison Ferry Co. on the north. The road will soon have its own transfer at Carondelet.

The belt line, which is as yet in its infancy, earned during six months \$12,700. This was accomplished in spite of the fact that the connections were not all complete.

**Indiana, Illinois & Iowa.**—Tracklaying on this road was resumed some weeks ago, and the rails have been laid from a point 5 miles east of Momence, Ill., eastward 6 miles to Sugar Creek. A ballast train is also at work. Five miles east of Sugar Creek the road will cross the Kankakee River, and there a bridge 600 feet long is to be erected, which will cause some delay. From the Kankakee crossing to North Judson, Ind., 28 miles, the grading is all done and track can be laid very quickly.

**Indianapolis & St. Louis.**—Some of the creditors of this road, which was sold under foreclosure in July last, are making claims. The St. Louis, Alton & Terre Haute Co. has filed an intervening petition with the United States Circuit Court, asking that its claim of \$664,874 for back rent due shall be paid out of the proceeds from the sale of the Indianapolis & St. Louis road before any distribution is made to bondholders. The raising of this question, it is stated by the attorneys in the case, will delay the payment of debts contracted before the receivership until Judge Drummond gives his decision in the matter, which, it is expected, will be rendered at an early day. This is the same claim that Judge Drummond before rendered judgment on against the Pennsylvania and the Cleveland, Columbus, Cincinnati & Indianapolis as guarantors, from which judgment an appeal is now pending in the United States Supreme Court.

**Jonesboro & Cape Girardeau.**—This company has been organized to build a railroad from Jonesboro, Ill., southwest to the Mississippi opposite Cape Girardeau, Mo. The distance is about 20 miles.

**Little Rock & Fort Smith.**—Notice has been given that the holders of the Arkansas state aid bonds will apply to the United States Circuit Court for the appointment of a receiver for this road, in accordance with the recent decision holding those bonds to be a prior lien upon the road.

**Louisiana Central.**—Work is soon to be begun on this road, which is to be an extension of the Louisiana Western from Vermillionville, La., east to Baton Rouge, 52 miles, in the interest of the Southern Pacific.

**Maine Shore Line.**—The Maine Legislature has passed a bill authorizing this company to extend its projected road from Ellsworth, Me., to a connection with the Eastern Maine road, and to use the tracks of that road from the place of connection to Bangor. The bill also extends the time for the completion of the road between Ellsworth and Calais to 1885, and provides that work must be begun before Aug. 1 next.

**Marietta & Cincinnati.**—The long and costly bridge over the Little Hocking at Athens, O., was partly knocked down by ice on Jan. 21. The damage was so far repaired as to permit trains to pass on the following day. The bridge was nearly new, the old bridge having been burned down last summer.

**Massachusetts Central.**—In Boston, Jan. 20, the directors held a meeting and practically resolved to issue a circular to the security-holders proposing a plan for the financial reorganization of the company. This will most likely be made public during the coming week. No details of the plan are as yet perfected, but it is quite likely to take the form of an issue of preferred stock, for which most of the present first-mortgage bondholders are said to be willing to exchange their bonds, and the creation of a new first mortgage for the completion of the road. The Boston Star says: "The plan of building from Bondville through Holyoke, Westfield and Great Barrington to a junction with the Poughkeepsie, Hartford & Boston, near Boston Corners, meets with much favor. The last named road, though now doing only a small local business, is said to have good terminal facilities at Poughkeepsie, by means of which coal and other heavy freights can be brought by water up the Hudson to Poughkeepsie and sent eastward by rail. Such a connection for the Massachusetts Central would not only give another line from Boston to the Hudson, but might also give a new impetus to the Poughkeepsie bridge scheme, on which some \$900,000 have already been expended, and which, if completed, would afford a Western connection for the through line. The Massachusetts Central when completed to Northampton—and three-quarters of the work is already done—will have a connection, via the New Haven & Northampton, with the Hoosac Tunnel line, and the proposed extension would give connections with New York at Holyoke, by the Connecticut River and the New York, New Haven & Hartford; at Westfield by the New Haven & Northampton; at Great Barrington, by the Housatonic, and at Boston Corners by the Harlem." It would also reach a section of Western Massachusetts which has now limited railroad connections, but also a very limited traffic.

**Massillon & Cleveland.**—A plan is on foot to buy this road, now operated by the Pennsylvania Company, and to extend it from Clinton, O., to Cleveland. The projectors are Cleveland parties, who own coal lands on the line. The road as it now stands is 12½ miles long, and has never earned its running expenses.

**Memphis & Charleston.**—Negotiations are still pending for the termination of the lease of this road to the East Tennessee, Virginia & Georgia Co., but no conclusion has yet been reached. The chief difficulties so far have been certain legal proceedings pending in Tennessee, and begun by a Memphis & Charleston stockholder, and the non-payment of the money advanced by the East Tennessee Co. under the lease. It is now said, however, that the East Tennessee Co. has withdrawn its consent to the abrogation of the lease, and is unwilling to surrender possession of the property, which seems to be very probable.

**Mexican National.**—This road is advertising its line from Laredo to Monterey (275 miles) in connection with the Texas-Mexican road, from Corpus Christi to Laredo, and invites shipments of freight to the mining districts of the Mexican States of Durango, Zacatecas, San Luis and Chihuahua as "the shortest and cheapest route." These districts are at a considerable distance from the part of the road now completed, but most of them are still further from any other railroad. The time to Monterey is given as 65 hours from St. Louis; the distance is 1,361 miles. A Pullman car runs through from St. Louis to Laredo. The railroad company advertises Monterey as a winter resort and a watering place, there being hot springs there. It also recommends examination of the mining districts on the line. The Texas-Mexican line is advertised as a sportsman's resort, abounding in game.

**Missouri Railroad Building.**—The Railroad Commissioners of Missouri report the following new track built in that state in 1882:

Cape Gir. & Southern, Lakeville to bey'd Castor River.....	7.00
Chl., Bur. & K. C., Laclede to Sumner.....	10.30
Eureka Springs, Seligman to state line.....	8.24
Fort Scott & Gulf, Joplin to Webb City.....	6.80
Kansas & Missouri (formerly Fort Scott & Carthage).....	4.60
E. C. S. & Memphis, Springfield to Lost Camp.....	97.00
Missouri Pacific, Carthage to Joplin.....	18.00
Missouri Pacific, Lexington connection.....	3.00
St. L. H. & Keokuk, Troy to Gilmore.....	22.95
St. L. Iron M. & S. (Doniphan Branch), Neeleyville to Black River.....	7.35
St. L. Salem & L. R., Homer to Plank Ore bank.....	4.10
St. L. & San F., Pacific to Meramec River.....	8.40
Springfield & Southern, Springfield to Ozark.....	19.47
Texas & St. L. (narrow gauge), Bird's Point to Pawpaw.....	35.00
Track (main line) laid in Missouri in 1882.....	252.11

Adding this to the track previously reported by the Com-

mission, and adding also some short sections built before 1882, but not hitherto reported, the total mileage in the state is now 4,490.15 miles.

**Mobile & Ohio.**—The reorganization of this company was completed some time ago, but the receivership has been continued for the purpose of closing up old business and conducting affairs until the reorganized company should be established on a firm basis. In Mobile, Jan. 24, a decree was entered in the United States Circuit Court, finally closing the receivership and turning over the road to the company. There will be no change in management. Mr. Wm. Butler Duncan, who is retired as Receiver, being also President of the Company.

**Morgan's Louisiana & Texas.**—Negotiations are pending for the sale of this company's railroad property to C. P. Huntington and others in the interest of the Southern Pacific Co., which has for some time desired to secure possession of the line from Vermillionville to New Orleans. For some time the Morgan Co. declined to sell, but it is now said the chief difficulty is in agreeing upon a price for the property.

**Nashville, Chattanooga & St. Louis.**—The following statement is published for the six months ending Dec. 31:

	Main line.	Branches.	Total.
Earnings.....	\$1,046,302	\$135,231	\$1,181,533
Expenses.....	594,047	59,571	653,618
Net earnings.....	\$452,255	\$75,660	\$527,915
Interest and taxes.....	278 0-0	42,908	320,837
Surplus.....	\$173,326	\$32,752	\$206,078

The main line includes the main stem, with the Shelbyville and Jasper branches, 354 miles in all. The branch lines include 196 miles in all, being all other lines worked by the company.

**New Bonds.**—New issues of bonds are on the market as follows:

**Central Iowa** first-mortgage, 6 per cent. bonds, issued on the new Eastern Division (O-kaloosa, Ia., to the Mississippi) at the rate of \$12,000 per mile, are offered by C. H. Venner & Co., of Boston. The amount now offered and the price are not stated.

**New York & Boston Inland.**—According to the statements made for this projected road the distance by its line between New York and Boston will be 196 miles, or 40 miles less than the present line by Springfield. The company proposes to use the Harlem road into New York, and probably the Providence road into Boston, leaving 176 miles to build. One tunnel two miles long is to be cut, so that the construction will require some time.

Among the parties named as interested in the project are: J. R. Bodwell, of Hallowell, Me.; Moses Webster, Vassalboro, Me.; S. W. Hale, Keene, N. H.; Charles T. Sablin, Montpelier, Vt.; William Rotch, of New Bedford, Mass.; W. F. Draper and George F. Johnson, both of Milford, Mass.; Samuel L. Ham, Peabody; John H. Buttrick, Lowell; James W. Clark, Framingham, Mass.; Moody Merrill, President of the Highland Street Railroad, Boston; George Cook, Boston; E. N. Shelton, Birmingham, Conn.; George B. Phelps, Watertown, N. Y.

**New York, Lake Erie & Western.**—This company's statement for November and the two months of its fiscal year from Oct. 1 to Nov. 30 is as follows:

	November.	Two months.
Earnings.....	\$ 818,824	\$3,637,834
Expenses.....	1,061,618	2,237,399
Net earnings.....	\$757,206	\$1,400,535
Per cent. of expenses.....	58.4	61.5

For the two months there was an increase of \$174,999, or 3.0 per cent., in earnings; a decrease of \$27,776, or 1.2 per cent., in expenses, and an increase of \$135,775, or 10.7 per cent., in net earnings.

In the United States Circuit Court in New York, Jan. 18, in the suit brought by certain holders of preferred stock to recover dividends for the year 1880, a decree was entered in accordance with the recent decision of the Court, holding that they were entitled to a dividend. Under this decision, on the stock held by the plaintiffs they were entitled on Jan. 15, 1881, to \$20,280. Judge Wheeler, in his decree, ordered this sum to be paid to the plaintiffs, with interest, which will make the full amount \$22,723.74. In order that any other stockholders of the company may receive their share of the dividend, Judge Wheeler further decreed that United States Commissioner John A. Shields should act as Master of the Court, for the purpose of ascertaining who such persons are and to what amount they are entitled.

**New York, Susquehanna & Western.**—At a meeting held in Jersey City, Jan. 18, the consolidation of the Blairstown Railroad Co. with this company was ratified. The stock of the Blairstown road was bought some time ago, and it has since been worked by this company. It is 11 miles long, from Blairstown, N. J., to Delaware Station; about 7 miles have been made part of the main line to the Water Gap, and the rest is used as a branch. New stock will be issued in place of the Blairstown stock.

**New York, West Shore & Buffalo.**—A dispatch from Newburg, N. Y., says that the tunnel under the Erie tracks in that city has been completed and tracks laid through it.

It is stated that temporary arrangements will be made to use the New York, Susquehanna & Western and the Pennsylvania tracks into Jersey City, so that local trains can be put on the road to Newburg and Middletown. This arrangement will last only until the Weehawken tunnel and docks are ready for use.

**Norfolk & Western.**—This company's statement for December and the year ending Dec. 31 is as follows:

	December.	Year.
Earnings.....	\$24,758	\$243,740
Expenses.....	123,575	1,322,577
Net earnings.....	\$101,183	\$1,107,163

Expenses include taxes. For the year there was an increase of \$162,452, or 7.2 per cent., in earnings; an increase of \$166,144, or 14.4 per cent., in expenses, and a decrease of \$3,692, or 0.3 per cent., in net earnings.

**Northern Pacific.**—At a meeting of the board in New York, last week, Vice-President Oakes presented a report of the progress of work. He said the track from the east had reached a point 9½ miles west of Livingston, at the head of the Yellowstone Valley, and from the west it was laid 345 miles east of Wallula Junction. A little over 300 miles of road remained to be finished, of which 250 miles were graded and ready for the track. The Mullan tunnel, near Helena, Montana, was pierced 7,765 feet, leaving 1,085 to be cut. Work in the Bozeman tunnel had advanced 694 feet, and 2,916 remained to be cut. A temporary track was being laid over the mountains at this point pending the completion of the tunnel. The coal-bunkers at New Tacoma, holding 3,000 tons of coal, from which shipments to San Francisco would be made, were finished. The total number



of passengers arriving at Portland last year in excess of the departures was 15,113. The estimated grain surplus next season for Oregon and Washington Territory was from 150,000 to 200,000 tons. There was an increasing cattle business in Western Washington Territory and Northern Idaho. The inaugural trip to Alaska would be made in June. The steamers would start from Portland.

**Ohio Central.**—The track on the extension of this road in West Virginia is reported all laid from the Ohio River at Pt. Pleasant to Charleston, a distance of 57 miles. The rails were nearly, if not all, put down by the close of the year, and the work of ballasting and finishing up has since been in progress. No time has yet been set for the opening of the road. Work is progressing on the bridge over the Ohio at Pt. Pleasant, which is to connect this extension with the line in Ohio.

**Ohio River, of West Virginia.**—At a recent meeting the stockholders of the Wheeling, Parkersburg & Charleston Co. voted to change the name to the Ohio River Railroad Co. They also voted to make the capital stock \$5,000,000, and to authorize a mortgage on the road. The projected line is down the West Virginia side of the Ohio River from Wheeling to Parkersburg.

**Pennsylvania.**—This company's statement shows for the month of December, as compared with December, 1881, on all lines east of Pittsburgh and Erie:

An increase in gross earnings of.....	\$425,418
An increase in expenses of.....	443,757
Net decrease.....	\$18,339
For the year 1882, as compared with 1881, the same lines show:	
An increase in gross earnings of.....	\$4,955,451
An increase in expenses of.....	3,937,395
Net increase.....	\$1,018,056

For the year 1882, all lines west of Pittsburgh show a surplus over all liabilities of \$1,924,365, being a decrease of \$723,973 as compared with 1881. The net increase on all the lines last year was therefore \$294,083.

**Pennsylvania, Slatop & New England.**—The trouble between this company, the Lehigh & Lackawanna and the Wind Gap & Delaware over the connection near Bangor, Pa., has not been settled. The connecting track has been relaid and a number of this company's employees who tried to tear it up were arrested. The case comes up before the Court at Easton next week, when some settlement may be made.

**Philadelphia & Reading.**—It is stated that the Receivers have had an offer to take \$2,000,000 car trust bonds, provided the issue of such security is authorized by the Court.

Alexander McEwen, a London banker, has filed a claim against the company for \$343,000 commission for his services in negotiating the issue of deferred income bonds. The company claims that no agreement was ever made with him, and that he is not entitled to any commission.

It is reported that the company is making arrangements for a branch or extension to leave the Bound Brook line at or near Bound Brook, N. J., and run east about 17 miles to Staten Island Sound in Woodbridge. The Sound will be crossed, presumably by a ferry, and a line run across Staten Island to the flats near Stapleton, where extensive coal docks will be built. The chief difficulty in the way of the proposed line would be the crossing of Staten Island Sound.

The petition for the dissolution of the receivership was presented to Judges McKennan and Butler in the United States Circuit Court at Philadelphia, Jan. 18. The application was made by James E. Gowen, counsel for the company, who stated that the parties to the suit—Moses Taylor and the Farmers' & Mechanics' National Bank—and others interested had agreed to the granting of the prayer of the petitioners. The petition sets forth that for the last two years the business of the companies conducted by the Receivers has resulted in net earnings more than sufficient not only to meet the interest on the mortgage indebtedness of the companies, but also to meet interest on all the obligations of the corporations, and that for the year ending Nov. 30, 1881, the surplus net profits over and above the charges named were \$153,256, and for the year ending Nov. 30, 1882, the surplus was \$882,941. The petition was accepted, and Feb. 14 fixed by the Court as the day for the hearing. The Clerk of the Court was instructed to give public notice of the application in this country and London, which will be done immediately.

The petition stated that, in spite of its large earnings, there are yet outstanding unpaid and unprovided for obligations as follows:

"First"—Receivers' certificates heretofore authorized by the Court to the amount of \$2,054,457.64.	
"Second"—Interest on obligations of the Philadelphia & Reading Railroad Co. and the Philadelphia & Reading Coal & Iron Co., which are subsequent in point of lien and charge to the mortgages for the default of the payment of interest on which the said Receivers were appointed, amounting, including the interest maturing Jan. 1 last, to \$1,431,465.55.	
The reasons why the Receivers' certificates and interest obligations have not been paid are explained by the statement that there was no way for the Receivers to raise money for new equipments, work and other items properly chargeable to capital account, so the Receivers, with the approval of the companies, have withdrawn the net income arising from the profits of the business, "to the amount of \$4,443,179 and upwards," which income has been invested, <i>inter alia</i> , as follows:	
For new engines and cars.....	\$2,457,876
For new railroads, real estate, improvements, etc.....	2,139,550
Funded and floating debt paid.....	850,459
Total.....	\$5,448,179

That the companies are now prepared to meet all their outstanding obligations which are now in arrears, provided that the locomotives, cars and rolling stock, the title to which is in the Receivers, and which have been acquired and paid for out of income, shall be conveyed by the Receivers to a trustee, to be held for a car trust, the certificates or process of which shall be used for the liquidation of the aforesaid receivers' certificates, amounting in the aggregate to \$2,054,457.

The traffic statement of the Railroad and the Coal & Iron companies for December, 1882, shows: Gross earnings of both companies, \$2,865,200.74; gross expenses, \$2,021,417.27; profit, \$843,783.47, against a profit of \$937,542.54 for December, 1881, which was exceptionally large. The profit for December, 1880, was \$540,456.65, and for December, 1879, \$610,736.99. The Receiver's full statement has not yet been received.

In the Dauphin County Court at Harrisburg, Pa., Jan. 23, decisions were filed against this road and the Receivers for taxes claimed by the state, in which judgment was ordered against the company for \$74,517.33, and also for \$79,479.65. The tax was levied on the gross receipts of the company. The company resisted the tax, holding that as the road was in the hands of the Receivers the company was not liable. Judge Simonton decided that it mattered not whether the road was in the hands of a receiver or the com-

pany proper, as the result to be obtained was one and the same.

A dispatch from Philadelphia, Jan. 24, says: "Proceedings in equity have been begun by the United States against the Philadelphia & Reading Railroad for the recovery of \$500,000, which the United States claims is due the Government as tax on scrip issued by the company. About two years ago the company issued scrip to the amount of \$5,000,000, and on it no tax has ever been paid to the Government. The law imposes a tax of 10 per cent. on all notes issued and circulated as money. Charles Biddle was appointed by the Circuit Court in this city as master to take testimony in the matter. A hearing was held at noon to-day. Several witnesses were examined, and their testimony was to the effect that they accepted the scrip in payment for merchandise which they sold to customers. Some of the witnesses stated that they took the scrip at par and a discount. The evidences also showed that in many instances the scrip was deposited in banks. The hearing was adjourned until a week from to day, when additional witnesses will be examined.

**Providence, Webster & Springfield.**—This company has been organized and a preliminary survey of the road made. The line is from Webster, Mass., northward to the Boston & Albany in the western part of the town of Auburn. The distance is about 15 miles, and the line is parallel and near to the Norwich & Worcester road.

**Richmond & Danville.**—The following statement is made for the quarter ending Dec. 31, being the first quarter of the current fiscal year:

Gross earnings.....	\$1,107,135
Expenses (56.6 per cent.).....	627,010
Net earnings.....	\$480,125
Interest and rental charges.....	377,076
Surplus.....	\$103,049

Charges include interest on the debenture bonds. The surplus for the quarter was equal to a little over 2 per cent. on the stock.

**Rome, Watertown & Ogdensburg.**—In New York last week a preliminary injunction was granted by Judge Barrett, in Supreme Court, Chambers, restraining this company from paying a dividend upon its income bonds. The directors of the company recently declared a 3 per cent. interest dividend upon the bonds mentioned, payable Jan. 20. Amasa T. Kingman, a stockholder of the company, alleges that this action of the directors is illegal. His complaint, and the affidavits supporting it, upon which the preliminary injunction was granted, set forth that the income bonds began on July 1, 1882, to draw interest, payable annually on Jan. 1, and that the interest is dependent upon the earnings of the company for the fiscal year ending Sept. 30. At the close of the last fiscal year, it is alleged, the earnings of the company were not sufficient to enable interest to be paid upon the income bonds, and hence the right of the holders of the bonds to a dividend cannot be determined until the close of the current fiscal year, and if the company's earnings are then found to be sufficient for the payment of interest on the bonds, that interest cannot legally be paid until Jan. 1, 1884. An order directing the company to show cause why the injunction should not be continued in force during the suit is returnable Jan. 29.

The officers of the company state that the earnings were sufficient to pay the interest on the income bonds, and that the facts will be clearly shown on the trial of the case.

**Saginaw Bay & Northwestern.**—It is reported that this road has been sold by its owners to the Michigan Central Co. for \$120,000. It was formerly known as the Glen-co, Pinconning & Lake Shore, and runs from Lake, Mich., west to Rogers, 22 miles. It was built as a logging road, but does some general business also.

**St. Louis Elevated & Rapid Transit Railway.**—A company by this name has been organized under the general railroad law of Missouri. The company proposes to construct a railroad from a point in St. Louis, near the intersection of Fifth and Walnut streets, westwardly to the city limits near the northwest corner of Forrest Park, with branches northwardly and southwardly. The length of these lines would be about 20 miles.

The capital is \$200,000. The following are the incorporators and subscribers to the stock who sub-scribe for 20 shares each: Ex-President U. S. Grant, A. W. Soper, F. K. Hain, R. I. Sloan, F. A. Marquand, Duncan D. Parmelee, John F. Dillon, New York; Adolphus Bonzano, Phoenixville, Pa.; Henry Wheeler, Philadelphia; Geo. W. Allen, John G. Priest, O. D. Tucker, R. C. Kerens, W. D. Griswold, and John W. Norton, St. Louis.

**St. Louis, Iron Mountain & Southern.**—Surveys are being made for a branch to Hot Springs, Ark., from some point on this road south of Little Rock. Several lines will be run. The construction of this branch has been threatened for some time, and the present survey may only be intended as a demonstration to bring the owners of the existing line from Malvern to Hot Springs to terms.

**San Joaquin & Sierra Nevada.**—From a report issued by this company it appears that during the past year, which was the first of its existence, it built 30 miles of road, extending from Brack's, in San Joaquin County, Cal., on the South Fork of the Mokelumne, to Wallace, in Calaveras County. By the terms of the incorporation it is the expressed intention of the company to build its line to the Big Tree Grove, which would give it a total length of 70 miles.

**Securities on the New York Stock Exchange.**—The following securities have been placed on the lists at the New York Stock Exchange:

Bradford, Bordell & Kinzy, \$500,000 stock and \$500,000 first-mortgage bonds.	
Canadian Pacific, \$55,000,000 stock. The authorized issue is \$100,000,000.	
Denver & Rio Grande, \$1,223,000 additional first consolidated mortgage bonds, Nos. 13,413 to 14,635, inclusive.	
Galveston, Harrisburg & San Antonio, \$13,500,000 first-mortgage 5 per cent. bonds and \$6,750,000 second mortgage 6 per cent. bonds on the extension from San Antonio to El Paso.	
Missouri, Kansas & Texas, \$903,000 additional general mortgage bonds, Nos. 40,412 to 41,314, inclusive.	
Oregon & Transcontinental, \$6,000,000 bonds of 1882, being 6 per cent., 40-year bonds secured upon branch lines built for the Northern Pacific.	
Pennsylvania Company, \$2,500,000 additional first-mortgage, 4½ per cent. bonds, Nos. 10,001 to 12,500, inclusive.	

**Southern Pacific.**—About 1 o'clock on the morning of Jan. 20 a passenger train on the Southern Pacific road stopped at Tehachapi, Cal., to detach the helping engine which had come with it up the grade. While both engines were detached, the train started off in some unexplained way down the grade of 120 ft. to the mile, and was soon running at a very high speed. After running about four miles the two sleeping cars with the mail, baggage and express cars, jumped the track at a curve and went down a bank about 15 ft. high, piling up in a bad wreck, while the passenger coach and smoking car broke loose and kept on some two

miles further, where they stopped without injury. In the mean time the wreck of the other cars caught fire and burned very rapidly, so that many of the passengers were unable to escape from the wreck and were burned to death. The total number of those killed and burned is believed to be 21 in all, two trainmen, 17 passengers and two unknown men, believed to be tramps stealing a ride. Of those who escaped two trainmen and 13 passengers were hurt, most of them not severely. It is, of course, uncertain how many of those burned were killed or injured before the engines were detached the air brakes were taken off and the hand brakes set, but both brakemen got off the train, one to uncouple the engines and one to re-light his lamp, it is said. Why the train started is uncertain; the company's theory is that the hand brakes were thrown off purposely by men who intended to run the train back and rob the passengers, and that these men had watched their opportunity while the brakemen were away from their posts. According to this theory the two unknown men found dead were the train robbers. It is said that two others, apparently tramps, were seen about the train, and that they escaped from the wreck and disappeared in the darkness. An investigation is now in progress.

**Southern Pacific Consolidation.**—A bill is now pending in Congress for permission to consolidate a number of lines eastward from Southern California into one line and one corporation, making a complete line from San Francisco to Port Allen, on the Mississippi River, opposite Baton Rouge, and practically, also, to New Orleans. These lines are as follows, viz.: The Southern Pacific companies, of California, Arizona and New Mexico, from San Francisco to El Paso, 1,275 miles; the Galveston, Harrisburg & San Antonio, from El Paso to Houston, 855 miles; the Texas & New Orleans, from Houston to Orange, 106 miles; the Louisiana Western, from Orange to Vermilion, 113 miles, and the Louisiana Central, from Vermilion to Port Allen, 52 miles. These lines make an aggregate of about 2,400 miles, and the consent of Congress is needed because some of the companies have been organized under Congressional charters and have land-grant claims which it is important to preserve.

**Storm.**—A very severe snow-storm, accompanied by extreme cold, began in Minnesota Jan. 20 and gradually moved eastward, causing everywhere much delay to trains and other inconveniences on the railroads. West of Chicago the storm was most severe and much trouble resulted. The intense cold caused much suffering, especially on delayed stock trains, cattle and hogs being actually frozen to death in many places. East of Cleveland there was but little snow, but the extreme cold extended to the seaboard, causing some suffering and making caution necessary in the movement of trains.

**Sussex Midland.**—This company has applied to the Delaware Legislature for leave to extend the line of its projected road to Lewes, with a branch to Rehoboth Beach.

**Tidewater Pipe Line.**—At the recent annual meeting in Titusville, Pa., a board of managers was declared elected which included only two of the old managers, the remaining three being representatives of the Standard Oil Co. The old managers, however, claimed that the election was not legally conducted and refused to surrender possession to the new board and the officers chosen by it. So far the old board has the advantage, having secured an injunction restraining the new board from taking possession; but a long legal contest seems probable.

**Troy & Boston.**—The verdict of the coroner's jury rendered Jan. 17 holds this company, its officials and employees responsible for the loss of life by a disaster at Melrose Dec. 19, when one freight train ran into another and 30 cars were wrecked, Frank Brandagee and John Riordan, of Pittsfield, Mass., were killed and several others badly injured. The verdict concludes: "We find Richard Bennett, Train Dispatcher, had knowledge of the dangerous proximity of the two trains; the trains were running under his orders; he wilfully disregarded all considerations of public safety in giving orders, and was guilty of gross carelessness in permitting station agent Thomas to leave the station at Melrose at a time when his presence there might have averted the accident. We find Bennett responsible for the death of Brandagee and Riordan; we find Joseph Crandall, Charles Killingbeck, Henry Winnard and Richard Bennett guilty of causing the death of Brandagee and Riordan, and that the killing of Brandagee and Riordan was criminal and not accidental." Let a warrant be issued for Crandall and others criminated by the jury.

The jury said further: "We feel it our duty to commend the precautionary measures adopted by the company since the accident, but there appears to be much in the management of the road that needs correcting. Overworked, poorly paid, and inexperienced employees, an overburdened single track, unsuitable cars and rusty brakes may be the necessary concomitants of an indigent corporation, but the interests and safety of the traveling public demand something different."

Superintendent Crandall and the other officers and employees included in this verdict have been arrested, and have given bail to await the result of further proceedings.

**United New Jersey.**—It is announced that the Camden & Amboy 6 per cent. loan falling due Feb. 1 next will be paid at maturity, holders of the bonds being given the option of taking new 4 per cent. 40-year bonds of the United New Jersey Co. at 93½. The amount of the loan now falling due is \$1,700,000.

**Vicksburg & Memphis.**—A Vicksburg, Miss., despatch says: "Three thousand tons of steel rails have just been delivered, 2,000 at Anthony's Ferry and 4,000 tons are en route between here and Memphis, of which 1,000 are to be delivered at Vicksburg and the remaining 3,000 to be shipped to New Orleans. General Manager Edwards returned to-day from Memphis. He reports 500 men at work on the Memphis & Vicksburg Railroad between the former place and Clarksville, Miss. He expects to let the contract for three more bridges on the line of road between here and Memphis, exclusive of that now in course of construction across the Yazoo River."

**Wabash, St. Louis & Pacific.**—It is again reported that this company is making arrangements to run Wagner sleeping and parlor cars over its lines, as soon as its present contracts with Pullman's Palace Car Co. expire.

**Washington & Hope.**—This short Arkansas line has been transferred to the Arkansas & Indian Territory Co., a new organization, which proposes extending the road northwest to the Indian Territory line and southeast into Louisiana.

**Weston & Buckhannon.**—The grading of this road is now nearly completed from Weston, W. Va., the terminus of the Clarksburg, Weston & Glenville road, east by south to Buckhannon, 16 miles. Tracklaying was begun in December, and about two miles laid. The iron for the road is all on hand, and will be laid as fast as the weather will permit.